

**AN INTEGRATED APPROACH TO THE SYNTAX-PHONOLOGY  
INTERFACE: A CROSS-LINGUISTIC STUDY**

**by**

**Yusra Yahya**

**Submitted to the Department of Linguistics and Contemporary English in Partial  
Fulfillment of the Requirements for the Degree of  
Doctor of Philosophy in English (Linguistics and Phonetics)**



**SCHOOL OF LANGUAGE SCIENCES  
THE ENGLISH AND FOREIGN LANGUAGES UNIVERSITY (EFL-U)  
HYDERABAD 500 605, INDIA**

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## **ABSTRACT**

This dissertation attempts to achieve two main goals. The first is to explore, within the context of Chomsky's Phase Theory and multiple spell-out (MSO) approach, a more general interface account integrating cross-linguistic variations regarding the ways in which syntactic structures can be defined (mapped) onto phonological form at the major phonological phrase level. The second aim is to translate (most of) these ways into a new (spell-out-based) OT grammar.

This study assumes and develops on two hypotheses. The first is that a (major) phonological phrase (MaP) is created by each application of spell-out (Dobashi, 2004, 2010; Ishihara, 2007; Richards, 2004; Revithiadou & Spyropoulos, 2009). The second hypothesis is that phase heads  $v^*$  and C are the loci of parametric variations (Richards, 2004 ; Chomsky, 2001; González-Vilbazo & López, 2012). The innovation here lies in combining the two hypotheses derivationally with the effect that the variability in the formation of (major) phonological phrases now depends on what is spelled-out, itself a function of a phase head  $v^*/C$ .

One new thesis I propose in this dissertation is that a phase head, mainly  $v^*$ , belongs to its domain for spell-out purposes contra Chomsky (2000, 2001 and subsequent work). However, whether the phase head undergoes interpretation along with its complement or

not is something that depends on the spell-out instruction that this phase head itself may instantiate.

Moreover, this work proposes an extension on Hale and Selkirk (1987) and Truckenbrodt (1995). Within the framework of Truckenbrodt (1995), my extension can be read as the following: just as Wrap-XP is defined in relation to VP as a lexical maximal projection, another form of Wrap call it Wrap-XP' applies to IP as a functional maximal projection. This extension falls as a natural result once we assume the new theory of phases and MSO. Wrap can now apply to VP and IP, which are nothing but the complements of the phase heads  $v^*$  and C respectively. This extension helps us to account for the larger (major) phonological phrase domains observed in languages as Xhosa (Zerbian, 2004). Moreover, if this extension is on the right track, then we perhaps have now the answer to handle the question *why is it that many linguists tend to assume that only CP is a phase (in some language)?* How this extension is derivationally implemented is a simple issue that builds on the role of phase heads though this time as transfer hinders, rather than transfer initiators. I, accordingly, propose that a phase head C with a strong wrapping spell-out instruction can, in the case where PIC2 is the relevant, result in hindering, rather than initiating, spell-out on a lower  $v^*$  phase with the consequence that we have only one instance of spell-out applying to the domain of C.

- Elements liable to wrapping effects:

- i. VP
- ii. IP (my proposal)

In this work, I also define, develop and defend a new spell-out mechanism. This mechanism builds on the role of phase heads as both the loci of spell-out features and the transfer triggers via either Phase Impenetrability Condition 1 (PIC1) and/or Phase Impenetrability Condition 2 (PIC2). The assumption here is that phase heads, mainly  $v^*$ , can regulate the spell-out process by deciding both the kind of spell-out applying and the timing of spell-out.

Moreover, it is proposed in this work that some forms of XP movement are not motivated by an EPP feature of a strong phase head mainly  $v^*$ , but they are rather motivated by a last resort strategy to accomplish the spell-out instruction of this phase head. Last, but not least, a new spell-out-based OT grammar is defined by translating the newly assumed spell-out functions into spell-out constraints.

Chapter 1 of this dissertation introduces the intended level of study namely the (major) phonological phrase or MaP, the problems defined in literature in relation to the formation of MaPs within the phase framework as well as some of the new notions assumed and developed throughout this dissertation. Chapter 2 presents a survey and critical review of the literature that has been written on the syntax-phonology interface concentrating on the MaP level.

Chapters 3 and 4 are devoted towards the development of a new and simple account of the variability in the formation of (major) phonological phrases. I assume here that (many) cross-linguistic variations in (major) phonological phrasing can be accounted for as resulting from a variable spell-out mechanism. The assumption here builds on the role of phase heads in driving the derivation and shaping phonological domains and the analysis has the advantage that the inventory of the strong phase heads does not vary from language to language.

More specifically, Chapter 3 proposes that phase heads (mainly  $v^*$ ) belong to their spell-out domains (contra Chomsky) and that whether they get spelled out along with (whole/some of) their domains or not is something that depends on the type of spell-out instructions these phase heads may instantiate. Chapter 4, on the other hand, develops the newly proposed spell-out mechanism in more detail. The assumption here is that phase heads, mainly  $v^*$ , can regulate the spell-out process by deciding both the kind of spell-out applying and the timing of spell-out relevant as follows:

- i. Phase heads as the *loci of parametric variations*: The type of spell-out applying A phase head ( $v^*$  or C) can include genuine instruction/s regarding how the element/s in its domain will be spelled-out

ii. Phase heads as *spell-out triggers*: The timing of spell-out relevant

Whether PIC1 or PIC2 will be in effect in a language (or in a context) is something decided by phase heads by taking into consideration the following two interacting factors:

- a. Phase heads as the *loci of parametric variations*.
- b. The fact that a (phase) head has reached its *landing site* (the role of head movement).

Chapter 5 aims at establishing a new and simple constraint-based grammar by replacing the spell-out parametric choices, upon which the spell-out mechanism is mainly established, by (spell-out-based) OT constraints.

The second part of this dissertation focuses on San'ani Yemeni Arabic. Chapter 6, building on both phonological (segmental) & durational cues to phrasing, establishes the surface phonological phrasing for SVO sentences in San'ani as (SVO) $\phi$ . Two accounts are developed to account for this observed phonological phrasing pattern. The first account is a spell-out-based account and the second account is a constraint-based one and the two accounts supremely validate each other .

*To her pure soul, my grandmother*

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## LIST OF SYMBOLS AND ABBREVIATIONS

SO	Spell-out
MSO	Multiple Spell-out
CSO	Cyclic Spell-out
MP	Minimalist Program
DbP	Derivation by Phase
PDbP	Phonological Derivation by Phase
OP	On Phases
FI	Feature Inheritance
PIC1	Phase Impenetrability Condition 1
PIC2	Phase Impenetrability Condition 2
LA	Lexical Array
PF	Phonetic Form
LF	Logical Form
S-M	Sensory-Motor (Interface)
C	Complementizer
C1	First Complement
C2	Second Complement
Comptn	Complement
V	Verb
v or v̥	Little v
T/I/Infl	Inflection
Subj/S	Subject
Obj/O	Object
DO	Direct Object
IO	Indirect Object
OS	Object Shift
Adj	Adjunct

CP	Complementizer Phrase
IP/TP	Inflection Phrase
VP	Verb Phrase
vP	Light verb Phrase
NP	Noun Phrase
XP, YP, ZP	Maximal Projections
ACC	Accusative
NOM	Nominative
Appl	Applicative
NEG	Negation
PST	Past
SG	Singular
PL	Plural
OT	Optimality theory
ω/PWd	Phonological word
MiP	Minor Phonological Phrase
MaP/ φ/ p-phrase	Major Phonological Phrase
IP	Intonational Phrase
P-Phrasing	(Major) Phonological Phrasing
SLH	Strict Layer Hypothesis
YA	Yemeni Arabic
EA	Egyptian Arabic
MSA	Modern Standard Arabic
art.	Articulation
Part	Partial
Max	Maximum
Min	Minimum
NSLs	Null Subject Languages

## REPRESENTATIONS OF THE SOUND SYSTEM

<i>Standard Arabic Consonants</i>	<i>IPA Representation</i>	<i>Simplified Symbols</i>
ف	? (in some dialects of YA it is realized as g)	?
ب	b	b
ت	t	t
ث	θ	TH
ج	dʒ (in some dialects of YA it is realized as g)	j
ح	ħ	ħ
خ	x	x
د	d	d
ذ	ð	th
ر	r	r
ز	z	z
س	s	s
ش	ʃ	sh/ š
ص	s <sup>f</sup>	S
ض	d <sup>f</sup>	D
ط	t <sup>f</sup>	T
ظ	ð <sup>f</sup>	dh
ع	ç	ç
غ	ɣ	gh
ف	f	f
ق	q (in San'ani YA it is realized as g)	g/q
ك	k	k
ل	l	l
م	m	m

ُ	n	n
ه	h	h
و	w	w
ي	j	y
<i>Standard Arabic Vowels</i>	<i>IPA Representation</i>	<i>Simplified Symbols</i>
-	a	a/ɑ
ـ	a:	aa/ɑ:
,	u	u/o
ـ	u:	uu/oo
-	i	i
ـ	i:	ii/ɪ

## **CHAPTER - 1**

### **INTRODUCTION**

This dissertation investigates the nature of the syntax-phonology interface and it takes the domain of the major phonological phrase (henceforth referred to as MaP), a level defined by the syntax-phonology mapping and showing a strong correlation with syntactic structure, as its focus. The study is one assuming the new phase framework, and aiming at deriving (most of) the ways in which syntactic structures are defined (mapped) as phonological domains<sup>1</sup> within a more general spell-out-based framework, and finally translating these ways into a new (spell-out-based) OT grammar.

Broadly speaking, this dissertation has two objectives to achieve. The first objective of this modest study is to propose an interface account that takes as its initial premise the assumption that phonological domains can be defined (at many cases) in relation to the way/s syntactic derivations proceed. Within the context of Chomsky's phases and multiple spell-out (henceforth MSO) approach, this dissertation proposes a new and more generalized spell-out-based interface account of the observed cross-linguistic variations in the formation of MaPs in relation to syntactic structures. Based on this spell-out-based account, a new constraint-based system will be finally developed translating (many of) the ways syntactic structures can be defined (mapped) onto phonological form into new OT constraints .

The second objective of this study is to establish the surface phonological phrasing for SVO declarative sentences in San'ani Yemeni by employing both segmental and durational cues to phrasing, and to account for the observed phrasing pattern(s) within the framework of both the new approach of phonological derivation by phase and the newly proposed OT grammar.

This chapter will introduce the intended level of study viz the MaP level in some detail, the problems defined in literature in relation to the formation of this level within the

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<sup>1</sup> Exclusively , the MaP or  $\phi$  level.

phase framework as well as some of the new notions to be developed later in Chapters 3 and 4 of this dissertation.

### 1.1 Intended Level of Study

The intended level of study is the major phonological phrase or MaP. This level is also known as the phonological phrase, p-phrase, intermediate phrase or  $\phi$  level. This level can be generally characterized as:

- ✓ One of the constituents of the prosodic hierarchy (Selkirk, 1995, 2000; Truckenbrodt, 1995, 1999, 2007), a hierarchy defined by the syntax-phonology mapping. Within this hierarchy, this level lies above the phonological word and below the intonational phrase.
- ✓ It shows a strong correlation with syntactic structure.

**Table (1): The prosodic hierarchy**

Syntax	Prosodic Hierarchy
Utterance	Prosodic Utterance
(Root) Clause	Intonational Phrase
XP	(Major) Phonological Phrase
X0	Phonological Word

(Truckenbrodt, 1995, p. 29)

However, there is these days a strong objection to the prosodic hierarchy theory (PHT) as the source of phonological constituency particularly in relation to the syntax-phonology realm and this objection ranges from a complete rejection of the relevance of the prosodic hierarchy to the syntax-phonology interface to a moderate view assuming that there may be other source/s of prosodic constituency in addition to those assumed within the prosodic phonology. Seidl (2001) is of the first kind as she indicates the irrelevance of the prosodic hierarchy to the syntax-phonology interface. She argues that there is no unique representation as the prosodic hierarchy to which all rule types can refer since there are some rules whose domains can not correspond to domains of this hierarchy and can rather be defined by making reference "more directly to syntax" (Seidl, 2001, p. 55). Elordieta (2008), on the other hand, opts for the moderate view by including the possibility that

" two types of phonological constituency coexist, one of them as envisioned by the PHT and another one as devised by the proponents of a more 'syntactic' type of constituency " (Elordieta, 2008, p. 279).

Notwithstanding this objection, the PHT still has its proponents. Ladd (2008) is an exponent of the prosodic structure and he assumes recursion to be a feature of the prosodic structure to account for the *empirical problems* caused by the Strict Layer Hypothesis and to quote his very words: " many researchers now accept that some form of recursion and/or indeterminate depth of structure must be incorporated into our understanding of prosodic structure" (Ladd, 2008, p. 293).

However and despite all the contradictions mentioned above, this study assumes the following:

- ✓ This study still uses the *major phonological phrase (MaP)* as a nomination to my level of study namely the one exhibiting a strong correlation with syntactic structure and generally defined by the multiple spell-out hypothesis (whether through the mediation of prosodic hierarchy or otherwise)
- ✓ It assumes that the MaP belongs to some phonological constituency/ies
- ✓ It assumes that the MaP can be a recursive (prosodic) structure produced by *recursive* mapping. The fact that the MaP can be recursive in structure is well-documented in literature. Specifically, Ladd (1986) states that MaPs may dominate other MaPs. Truckenbrodt (1995), an end-based theory, also assumes a recursive MaP structure for Kimatuumbi to account for the domains of vowel shortening (VS) and phrasal tone insertion (PTI) as MaP domains.

### **1.1.1 Intended Level of Study: A Phase-Based Definition**

My intended level of study (MaP) is defined within the phase theory as the level created at each spell-out. Accordingly, a MaP is a result of cyclic syntax-prosody mapping of spell-out (SO) domains onto prosody (Dobashi 2004; Ishihara, 2007; Richards, 2004; Revithiadou & Spyropoulos, 2009). This hypothesis is formulated as mapping algorithms within the framework of both Dobashi (2004) and Revithiadou and Spyropoulos (2009) as it is indicated below.

- *Syntax-Phonology Mapping*

A phonological string mapped to the phonological component by spell-out corresponds to a phonological phrase ( Dobashi, 2004, p. 1).

- *PF Corollary of GPSC*<sup>2</sup>

The edges of a derivational cascade are aligned with a p-phrase boundary (Revithiadou & Spyropoulos, 2009, p. 206).

## 1.2 A New Thesis of the Interface:A Brief Introduction

The present study is a phase-based one that sets out to propose solutions for some of the interface problems left unaccounted for by the existing (phonological) phase-based theories. The study can be defined as an attempt to provide a unified account of the different (though limited) ways the MaP domains can vary in their formation. The account to be developed in this dissertation is one couched within the framework of the phase theory and MSO (Chomsky, 2000, 2001, 2004) and making use of phasal notions as *what constitutes a spell-out domain*, the Phase Impenetrability Condition in its two versions (i.e., PIC1 & PIC2) and Phase Sliding (Gallego, 2010) among others. The new proposal also shares the same line of thought found in some studies assuming that functional heads, mainly phasal ones, are the loci of parametric variations. The details of the new proposal are discussed in the third and fourth chapters of this work.

The goal of this work is, in a word, to get to the bottom of the unsettled interface issue known as the *mapping puzzle*. The mapping puzzle can perhaps be studied along the following lines:

- I. Size issue: Can we account for the fact that there is cross-linguistic variation as to which portions of syntax can be relevant for phonology within the framework of a more generalized approach?

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<sup>2</sup> GPSC stands for the Generalized Principle of Strict Cyclicity which entails that “ all syntactic, phonological and interpretative operations take place within the derivational cycles of cascades” (Revithiadou & Spyropoulos, 2009, p. 206)

II. Assuming the phase framework, and if spell-out is the only mechanism connecting syntax and phonology, what could be the possible constraints governing/ regulating this mechanism?

### **1.3 The Problems**

Within the new theory of phases and MSO, it is generally assumed that spell-out is the only interface operation connecting syntax and phonology and that a phonological phrase is created at each spell-out. However, assuming Chomsky's (2001) definition of what constitutes a spell-out domain (i.e., the complement of a phase head) is not always consistent with observed cross-linguistic (phonological) facts. Thus, we find other interpretations of spell-out domains. In Fox and Pesetsky's (2005) proposal, phases and spell-out domains are essentially the same:  $v^*P$  and CP, and such a proposal is also adopted by Ishihara (2007).

- *Chomsky (2001)*

- a. Phase:  $v^*P$  and CP
- b. SO domain: VP and TP

- *Fox and Pesetsky (2005)*

- a. Phase:  $v^*P$  and CP
- b. SO domain:  $v^*P$  and CP

- *Ishihara (2007)*

- a. Phase:  $v^*P$  and CP
- b. SO domain:  $v^*P$  and CP (excluding adjuncts and A' –moved material) (p. 146)

Each of the two definitions partially succeeds by accounting for some data. On the one hand, many interface accounts as that of Dobashi (2004) and Kratzer and Selkirk (2007) among others assume Chomsky's DbP definition of a phase and spell-out domain in accounting for major phonological phrasing. On the other hand, we have interface accounts that build on the spell-out-domain definition within Fox and Pesetsky (2005)

and to mention one we have Ishihara (2007), a case study accounting for major phonological phrasing in Japanese<sup>3</sup>.

This should not in itself be a problem because it may be the case that languages vary, though in limited ways, as to whether they can refer to the whole phase, as a syntactic structure, or to some specific parts of it. This is also consistent with the fact that phonology is *selectively sensitive* and that it can see wholes or parts.

The real problem is that it does not seem plausible to use two different definitions of what can be defined as a spell-out domain to account for variations. There is a need to reduce the two definitions into one while pertaining the merits of the two. Thus, the question that raises itself at this point is how can we account for this cross-linguistic variability while pertaining to a single definition of what constitutes a spell-out domain. Chapters 3 and 4 of this dissertation address this question in detail. Chapter 3 proposes that we can use only one definition of phase and spell-out domain namely the one defined within Chomsky (2001) provided that we assume that a phase head<sup>4</sup> does belong to its spell-out domain, while Chapter 4 and 3 assume that the timing of spell-out plays an important role in determining the size of a spelled-out domain.

The second problem to tackle is that there is variation on whether the unit of spell-out should correspond directly (wholly) to a MaP or not? Thus, on the one hand, and within models assuming what is referred to as the *simplest theory* of prosodic spell-out, we find that the entire spell-out domain is directly defined (mapped) onto a phonological phrase (e.g., Ishihara, 2007). On the other hand, there are interface theories in which the spell-out domain does not correspond directly onto a MaP as it is the case with the theory developed within Dobashi (2004). Thus, there is a real need to put these variations within a frame. This problem is tackled in detail in Chapter 4. Chapter 4 develops a new spell-out mechanism which is mainly based on the assumption that variations in what is

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<sup>3</sup> All the studies mentioned in this paragraph will be discussed in some detail in Chapters 2 and 3 of this work.

<sup>4</sup> One point I want to make it clear here is that what I mean by a phase is a strong phase, and what I refer to as a phase head means a strong phase head.

spelled-out is dependent on the kind of the spell-out instruction that a phase head may include.

Another question to answer is what constitutes a phase, in the first place? Basically, only  $v^*P$  and CP (Chomsky, 2000, 2001) are considered to be phases<sup>5</sup>, and this is the assumption entertained in this dissertation. Having limited phases to their original definition namely only CP and  $v^*P$  are phases, we should tackle another issue. Can only CPs, but not  $v^*Ps$ , be phases in some languages? Or should we have a unified account of what can be considered as MaP-spelling-out phases, namely both CP and  $v^*P$ ? Generally speaking, most of the phase-based theories assume that both CP and  $v^*P$  are phases. However, we can find some deviations. Simpson and Wu (2002), for example, indicates that the patterns in both Taiwanese and English suggest that CPs but not  $v^*Ps$  are submitted to cyclic spell-out as "the input to cyclic spell-out is the inner core of a CP phase composed of the C head and its TP/IP complement"<sup>6</sup> (p.15). They discuss two possibilities regarding the status of  $v^*Ps$ , which are then questioned. The first is that  $v^*Ps$  are not simply phases and the second is that they are not input to cyclic spell-out. They finally conclude that it is not an *easy matter to decide* and are satisfied to leave it as an open issue for further research. Similarly, Pak (2008) assumes that only CP can be a phase. In her analysis, Pak proposes that  $v^*$  in Huave does not result in spell-out and proposes two explanations of which the first seems in line with my aim of reaching a unified definition of what constitutes a phase. The first account is that  $v^*$  is a phase head in Huave and we do not see the effect of spell-out due to the raising of all  $v^*P$  internal material to higher projections. The second account is that  $v^*$  is not a phase head cross-linguistically.

However, and since I am trying to reach a unified account of what constitutes a phase, I will stick to the fact that  $v^*P$  and CP are both strong phases (Chomsky, 2001) and that

<sup>5</sup> However, subsequent work on phases as Legate (2003) proposes more phases.

<sup>6</sup> 'Understanding Cyclic Spell-out' and this dissertation both try to tackle the issue of the *non-uniformity of input forms to CSO*, however, the two differ in the way they approach the issue. In 'Understanding Cyclic Spell-out', Simpson and Wu assume this non-uniformity to result from what can be considered as a phase whereas in my analysis I assume the cross-linguistic variability of occurrences of CSO to be a consequence of the spell-out mechanism keeping the inventory of strong phases untouched (i.e.,  $v^*P$  & CP).

both can spell-out MaPs. I will also assume that, in some languages, we never see the effect of spell-out on the  $v^*P$  as spell-out only applies to the domain of C, due to both a delay of spell-out on the  $v^*P$  in ways induced by PIC2 as well as the existence of a strong feature in the higher phase head C that instructs a wrapping of its whole domain onto one MaP disregarding spell-out on the  $v^*P$  phase, a proposal to be developed in detail in Chapter 4.

To wrap up, the problems that this study addresses are interface ones: There is a need to put the existing variations among the phase-based interface theories in mapping the MaP domains within a more integrated and simple approach. The fact that there are variations in determining the MaP domain should not be a problem in itself , the problem is that we should be able to put these variations within a pattern .

Hence, a successful theory is one that can:1- Keep the definition of (strong) phase intact because any change in defining the phase, *as a universal structure, is a weakening of the phase theory itself*, and 2- Account for the fact that surface major phonological phrasing is not always isomorphic to the spell-out domain of a phase by answering the following two questions:

- ✓ How can we account for the cross-linguistic variability in MaP formation while pertaining to a single definition of what constitutes a spell-out domain?
- ✓ Can we provide a good story to account for the fact that the unit of spell-out may/ may not correspond directly (wholly) onto a MaP?

## 1.4 Outline of the Thesis

The overall structure of this dissertation is as follows. The dissertation, and as indicated at the beginning of this chapter, is designed to serve two objectives and thus it will be divided into two parts. The first part will be an expansion of the notions discussed in this chapter and will include Chapters 2, 3 and 4. Specifically speaking, in Chapter 2, I will present the main trends assumed in accounting for the interface and review the current major theories of phonological phrasing. I will first review the two main representation-based theories namely the edge-based theory and the relation-based theory, and also outline the OT grammar of the syntax-phonology interface used within the edge-based.

Later in the chapter, I will review the phase-based interface theory in some detail focusing on its variations, advantages and some of its shortcomings. In Chapters 3 and 4, I will develop the new spell-out mechanism in detail and refer to some cross-linguistic facts to authenticate my claims. Chapter 5 will establish a new (spell-out-based) OT grammar for the new spell-out-based account assumed in the dissertation and I will show how the newly proposed OT constraints can practically help us to account for the different phrasing patterns observed in Chichewa, Kimatuumbi, Chi Mwi:ni and Xhosa.

The second part of this dissertation includes Chapter 6. Here, a small experiment is carried out. Employing both phonological and durational cues to phonological phrasing, the surface phonological phrasing in San'ani Yemeni is defined as (SVO) $\phi$ . The emerging phrasing pattern is then accounted for within both the new spell-out-based approach argued for in Chapters 3 and 4 and the newly proposed OT grammar developed in Chapter 5. Chapter 7 is the conclusion.

## CHAPTER - 2

### Syntax-Phonology Interface: A Survey and Critical Review

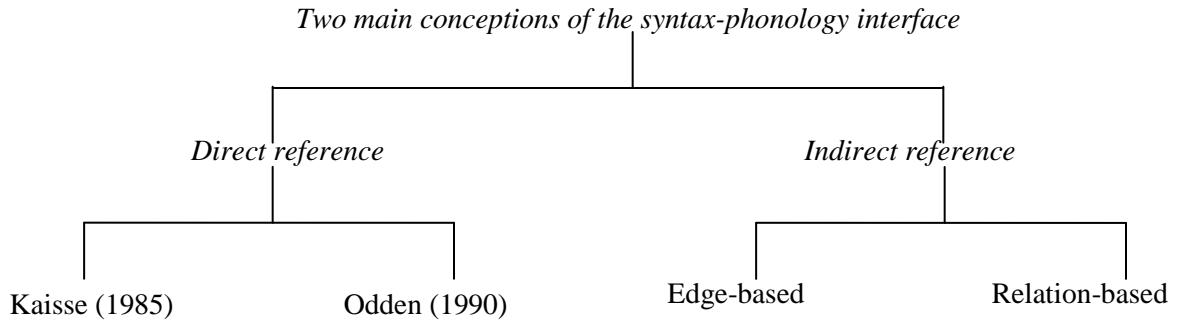
#### **2.0 Introduction**

This chapter introduces the two major current theories accounting for the syntax-phonology interface namely the prosodic hierarchy theory, a representation-based theory, and the phase theory, a derivational-based theory. The main purpose of this chapter is to assess the two existing theories by presenting both their shortcomings and advantages. Despite the fact that the phase theory is shown to be more superior, it will be indicated that existing phase theories have not taken the burden of answering the main question lying at the heart of the interface namely: *How can we account for cross-linguistic variations in phonological domains formation within the framework of a more general phase framework?*

The overall design of this chapter goes as follows. Section 2.1 is a review on the two main accounts of the interface namely the direct and indirect reference accounts. Section 2.2 presents the two main indirect reference theories and discuss their main shortcomings. Section 2.3 is a general outline of the optimality theory version used within the end-based framework to account for the interface. Section 2.4 is dedicated to the new theory of phases showing both its advantages and some of the problems it has to tackle.

#### **2.1 Direct and Indirect Reference Accounts**

The main idea assumed within all syntax-phonology interface theories is that phonological rules can refer to (limited) syntactic information as domains for their application. However, the nature of this relation is a debated issue, resulting in the development of two accounts of the interface: direct and indirect reference accounts.



**Figure (1)**

### A. The Indirect Reference Account

The following are the main concepts within the indirect reference accounts:

- Indirect reference: Phonological rules cannot refer directly to (specific) syntactic structures as domains for their application but rather to abstract prosodic constituents built from these syntactic structures and theories assuming the indirect reference account are the edge-based theory (Selkirk 1995, 2000; Truckenbrodt, 1995, 1999, 2007) as well as the relation-based theory (Nespor & Vogel, 1986).
- Mediation: Phonological rules can only refer to intermediate abstract structures built from syntax and known as the prosodic hierarchy. The table below shows the prosodic constituents to which phonological rules can refer as well as the syntactic pieces from which these prosodic constituents are constructed.
- Mapping rules: Indirect reference theories employ syntax-phonology mapping rules as the Alignment constraints within the end-based theory.
- The basic argument used by indirect reference theories against direct reference ones is the existence of cases of non-isomorphism or mismatches between phonological domains and syntactic structures at the levels of the (major) phonological phrase and the intonational phrase.

**Table (1): The prosodic hierarchy**

Syntax	Prosodic Hierarchy
Utterance	Prosodic Utterance
(Root) Clause	Intonational Phrase
XP	(Major) Phonological Phrase
X0	Phonological Word

(Truckenbrodt, 1995, p. 29)

## B. The Direct Reference Account

On the other hand, there is another account of the interface known as the direct reference account and the main direct reference theories are Kaisse (1985) and Odden (1990). The following are the main concepts within the direct reference accounts:

- Direct reference: phonological rules can refer directly to syntactic information as domains for their application
- No mediation or mapping rules: Direct reference assumes no mediation and thus imposes no mapping rules as compared with the indirect reference. This is because “the notions relevant to syntax are found to be relevant to phonology too, e.g., notions of c-command, government, lexical government” (Nagarajan, 1994, p. 1).

## 2.2 The Two Main Indirect Reference Theories of the Interface

The end-based and relation-based theories are the two major representation-based theories of the interface. The two theories are similar in two main respects: The first is that they are both developed within the syntax of the X-bar theory and the second is that they are both indirect reference theories assuming the prosodic hierarchy theory. However, the main difference between the two theories lies in their implementation of different mapping algorithms for the formation of the MaP domain. I will present below the mapping algorithms employed by these two theories as well as the phonological phrasing possibilities predicted by these mapping algorithms for SVO languages.

### 2.2.1 The Relation-Based Theory

#### a. The Mapping Algorithm/s for the Formation of MaPs ( $\phi$ s)

The syntax-phonology mapping rules for the formation of a MaP, as defined within Nespor and Vogel (1986), can be simply stated as follows:

- i. Basic mapping algorithm: Group a lexical head X together with all phonological words on its non-recursive side, up to the first head that is outside the maximal projection of X. Then, join these elements into a MaP.
- ii. Optional rule: A non-branching phrase that is the first complement of a head X on its recursive side may get optionally joined into the MaP that contains X.

#### b. Predicted Phrasings for SVO Languages<sup>7</sup>

- i. The phrasing predicted by the basic mapping algorithm is  $(S)\phi (V)\phi (O)\phi$
- ii. The phrasing predicted by the optional rule is  $(S)\phi (VO)\phi$

### 2.2.2 The Edge-Based or End-Based Theory

#### a. The Mapping Algorithms for the Formation of MaPs ( $\phi$ s)

There are two Align mapping algorithms assumed by all end-based theories (Selkirk, 1995, 2000; Truckenbrodt, 1995, 1999, 2007) and are defined below. Selkirk (1995) indicates that languages can make a paradigmatic choice between right or left Align(ment) so that a language can only have one of these mappings in effect. However, Truckenbrodt (2007) assumes that these two Align mappings are a part of the grammar of

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<sup>7</sup> Assuming a syntactic structure [<sub>IP</sub> NP<sub>subj</sub> Infl [VP V NP<sub>obj</sub>]], we first locate lexical heads. We have here three lexical heads: the head of NP<sub>subj</sub>, V and the head of NP<sub>obj</sub>. Since the structure above is head initial, the non-recursive side is the left side. Thus, NP<sub>subj</sub> and NP<sub>obj</sub> correspond onto their own MaPs. V is phrased with inflection since inflection is on its non-recursive side and it is a non-lexical category. Hence, the surface phonological phrasing we get here is: (NP<sub>subj</sub>) $\phi$  (Infl V) $\phi$  (NP<sub>obj</sub>) $\phi$  = (S) $\phi$  (V) $\phi$  (O) $\phi$ . However, if we assume the optional rule of restructuring, then (NP<sub>obj</sub>) as the first complement of V on its recursive side can be restructured into the preceding MaP including the head V, if this complement is non-branching. The phrasing we get in this case is (S) $\phi$  (V O) $\phi$ .

Such kind of mapping is successful in accounting for languages as Italian.

- *Italian*: (S) $\phi$  (V) $\phi$  (O) $\phi$  or  
(S) $\phi$  (V O) $\phi$  if O is non-branching

every language and that the differences between languages lie in the ranking between these two mapping constraints.

- Phonological phrase ( $\phi$ )
  - I. Align  $XP, L$ : Align ( $XP, L; \phi, L$ )
  - II. Align  $XP, R$ : Align ( $XP, R; \phi, R$ ) (Truckenbrodt, 1995)

The two constraints above can be read as align the right/left edge of every lexical XP with the right/left edge of a MaP.

#### b. Predicted Phrasings for SVO Languages

- I. The phrasing predicted by Align  $XP, R$  is always  $(S)\phi (VO)\phi$ <sup>8</sup>
- II. The phrasing predicted by Align  $XP, L$  is always  $(S)\phi (V)\phi (O)\phi$

One point to add is that the end-based theory could successfully account for variations from the two basic phrasings mentioned above by adding two more constraints to its grammar and this makes the end-based more superior to the relation-based theory by having greater coverage of data. One of the constraints is an interface condition namely *Wrap-XP* (Truckenbrodt 1995, 1999) and the other is the phonological constraint of weight defined within Selkirk (2000).

- I. *Wrap-XP*: Each XP is contained in a phonological phrase (Truckenbrodt, 1999. p. 228).
- II. A (major) phonological phrase should contain at least/at most/exactly two minor/accidental phonological phrases (Selkirk, 2000).

#### 2.2.3 Shortcomings of the End-Based and Relation-Based Theories

Having explained the basic and related concepts for our discussion, we are now in a position to define some of the shortcomings of these theories. Thus, in this section, I will indicate the main shortcomings of the edge-based and relation-based theories.

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<sup>8</sup> To illustrate the way the end-based mapping works, let us derive the surface phonological phrasing for the structure [IP NP<sub>Subj</sub> Infl [VP V NP<sub>Obj</sub>]] assuming the mapping algorithm Align-XP, R . We have in this structure, three maximal projections of lexical categories: NP<sub>Subj</sub>, VP and NP<sub>Obj</sub>. Applying Align XP,R, the right edges of these categories are mapped to the right edges of phonological phrases.Thus, the right edge of NP<sub>Subj</sub> corresponds to the right edge of a  $\phi$ , and the right edge of VP , as well as that of NP<sub>Obj</sub>, correspond to the right edge of a  $\phi$ , yielding the surface phonological phrasing  $(NP_{Subj})\phi (Infl V NP_{Obj})\phi$ . Such a mapping accounts for the phonological phrasing pattern  $(S)\phi (VO)\phi$  found in in languages as Chi Mwi:ni and Chichewa.

*1- Earlier theories do not fit within the current syntactic assumptions*

- a. Indirect reference theories discussed above are developed within the X-bar syntax, and hence they refer to notions as maximal projections, the distinction between functional and lexical maximal projections, as only lexical ones are subject to the interface mapping (constraints), branchingness, and directionality in syntax (right/ left edges of XP) among others which all do not exist in the Bare Phrase Structure theory<sup>9</sup>.
- b. Neither the end-based nor the relation-based mapping algorithms consider the verb movement to *v* or *T*. More specifically, Align and Wrap constraints are built upon a syntax that does not consider the verb movement to *v* or *T*. This shortcoming is defined within both Seidl (2001) and Dobashi (2004) and to quote Dobashi's own words "...neither Nespor and Vogel (1986) nor Selkirk (1986) discuss the verb movement and the status of the maximal projection of a functional category to which the verb is adjoined..." (More on Aŋlo dialect of Ewe, para. 10).

*2- Representational theories*

As representational theories, they are unable to account for some variations resulting from the derivational history of items. That is, they cannot account for variations resulting from syntactic factors as topicalization and movements.

*3- Direct information available in the syntactic structure*

Seidl (2001) indicates the existence of phonological rules in some Bantu languages that apply to the phase. Specifically, Seidl shows that a phrasal tone insertion rule in Kimatuumbi applies to the edge of a phase (its left periphery). This kind of rule falls outside the scope of the prosodic hierarchy theory because this rule refers to very specific syntactic information, and *does not generalize across X' categories*. As indirect reference

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<sup>9</sup>Within the framework of Bare Phrase Structure theory (Chomsky, 1995, and subsequent work), the phrase structure consists of only lexical items. Accordingly, phrasal notions such as *maximal projections* or *bar levels* are not primitive notions but rather derivative ones.

theories developed within the X-bar syntax, both the end-based and relation-based theories have no ways to directly define or refer to such domains.

#### *4- No overall coverage of all possible phrasal domains: The single mapping problem*

Both the end-based and relation-based theories have only one single mapping algorithm to account for the syntax phonology interface at the  $\phi$  level in all SVO languages .Thus, variations in phrasing or cases that are not expected by the mapping algorithm are either left unaccounted for, or are accounted for (only) by considering the effects of non-syntactic factors as it is the case with the end-based theory.

The single mapping strategy results in the fact that there are many cases which are covered by one theory but not the other. For example, the phrasing predicted by the relation-based theory is  $(S)\phi (V)\phi (O)\phi$  and it can only predict the phrasing  $(S)\phi (VO)\phi$  by an optional rule of restructuring which adjoins a non-branching complement to the verb. However, there are many languages in which the verb and object are always phrased together whether or not the object is branching as it is the case with Chichewa and this phrasing is predicted within the end-based theory by Align-XP,R.

The end-based, on the other hand, cannot predict the phrasing where the subject, the verb and the object are phrased separately (i.e.,  $(S)\phi (V)\phi (O)\phi$ ) in right-branching languages as French, a phrasing accounted for by the relation-based theory. This is due to the assumption that right-recursive (i.e VO) languages are accounted for via Align-XP,R while left-recursive (i.e, OV) languages are accounted for by Align-XP,L<sup>10</sup>.

Apart from that, there are cases which find no account within both the end-based and relation-based theories. A crucial case can be a language with the phrasing  $(SVOO)\phi$ . Zerbian (2007) indicates that Haya, Kinyambo, Xhosa and North Sotho have such a phrasing. The phrasing of the subject with the verb and two objects together cannot be

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<sup>10</sup> Worth mentioning here is that Truckenbrodt (1995) indicates that although in right-branching structures, Align-XP, R is supposed to be the relevant constraint, while in left-branching structures, it is Align-XP, L that is assumed to be in effect, this is not universal but rather a markedness tendency.

accounted for in either of the theories, except by considering the role of phonological factors (of weight and speech rate) as it is the case within the end-based.

However, new theories of the interface indicate that variations in phrasing cannot only result from the dominance of non-syntactic factors, as it is assumed by the end-based theory, but they can also result from the syntax-phonology mapping itself. Seidl (2001), for example, indicates the necessity for defining two syntax-phonology mappings because the (major) phonological phrase domain cannot be uniquely predicted by a single mapping due to the existence of what she calls *Late* and *Early rules* targeting different domains.

### *5 –Objections against the prosodic hierarchy*

Seidl (2001), using some linguistic phenomena, falsifies the prosodic heirarchy theory, the cornerstone of both the end-based and relation-based theories. According to her, the prosodic heirarchy cannot cover the domains of the application of certain phonological phenomena. Seidl (2001) even goes on to assume its irrelevance for the syntax-phonology interface because it makes 'false predictions about the phonological domains of certain languages' (p. 19).

However, and before going to the details of Seidl's (2001) objection to the prosodic hierarchy, I want to indicate that Seidl (2001) is not the only one to object to the Strict Layer Hypothesis. Ladd (2008), for example, makes it explicit that "the SLH clearly causes empirical problems. For example, both Hyman, Katamba, and Walusimbi (1987) and Chen (1987) point to bracketing paradoxes that arise from assuming the SLH in languages with complex tone sandhi. Some of my own work (esp. Ladd 1986 and the first edition of this book) has drawn attention to the difficulty of reconciling the SLH with phonetic evidence for degrees of boundary strength" (p. 293). However, the solution assumed in Ladd (2008) is different from that of Seidl (2001). His solution lies in the acceptance of the fact "that some form of recursion and/or indeterminate depth of structure must be incorporated into our understanding of prosodic structure" (Ladd, 2008, p. 293). Thus, non-recursion of the prosodic heirarchy loses its status as an unviolable constraint, and this is the same position taken by theories as Truckenbrodt (1995,1999).

Let us go on now to discuss the details of the two problems with the prosodic heirarchy theory diagnosed in Seidl (2001). These two problems are *domain clustering* and *domain paradoxes*. Beginning with domain clustering, Seidl defines it as the "situation where it does not seem that there are enough levels in the Prosodic Heirarchy to cover the domains in which prosodic rules apply" (Seidl, 2001, p. 21). Seidl shows that the main assumption within the prosodic heirarchy of the existence of only four levels defined by the syntax-phonology interface (i.e., the phonological word, the major phoenological phrase, the intonational phrase and the prosodic utterance) can be falsified by data from Mende and Kimatuumbi where domains for rule application do not correspond to domains within the prosodic heirarchy and rather entail a direct reference to syntax.

The second problem with the prosodic heirarchy discussed by Seidl is what is known as domain paradoxes. Domain paradoxes is simply a case where different phonological rules refer to different bracketing of domains resulting in overlapping and she illustrates this violation of the layerdness of the Strict Layer Hypothesis (Selkirk, 1984) by examples from Yoruba, Luganda and Korean.

Seidl solves these two problems by assuming the existence of two parses: A morphosyntactic parse and a phonological parse to which different rules can refer. She also assumes the irrelevance of the prosodic constituents, and hence the prosodic heirarchy, for the syntax-phonology mapping.

## **2.3 Overview of the Interface Version of the Optimality Theory**

### **2.3.1 Introduction**

To begin with, it is notable to know that Optimality Theory (frequently abbreviated as OT) is a linguistic model proposing that the observed forms of languages arise from the interaction between conflicting constraints. There are two basic types of constraints: faithfulness constraints and markedness constraints.

Selkirk (1995) buys the OT framework of ranked constraints and extends it to the area of the syntax-phonology interface. Generally speaking, the end-based or edge-based theory (Selkirk 1995, 2000; Truckenbrodt 1995, 1999, 2007) is, to the best of my knowledge,

the only interface theory developed within the OT framework. The end-based theory has an OT grammar which mainly consists of two sets: interface constraints and markedness or well-formedness constraints. The interface constraints are the constraints that define the syntax-phonology mapping whereas the well-formedness constraints are the pure phonological constraints regulating the (maximum/minimum/exact) size of a prosodic constituent.

However, there are also constraints on prosodic domination assumed in Selkirk's (1995) theory which are nothing but a paraphrasing of the Strict Layer Hypothesis. These constraints are non-recursivity, exhaustivity, layeredness and headedness. These constraints are assumed to be always obeyed and thus are no longer present in any OT account of a language. However, there are cases where non-recursivity and exhaustivity can be violated and thus should be included in the OT account as violated constraints while layeredness and headedness are always undominated and thus there is no need to include them in the OT grammar. Moreover, Truckenbrodt (1995) also introduces two constraints, one regulates stress assignment and the other is a constraint called the *prominence requirement of focus*. All these constraints will be discussed below in some detail.

### **2.3.2 Constraints on Prosodic Domination**

I choose to talk about these constraints in the beginning because they are not only related to the phonological phrase, our level of study, but to all prosodic constituents. These constraints are general constraints which are entailed by the Strict Layer Hypothesis (Selkirk, 1984). Actually, the Strict Layer Hypothesis can be formulated as a number of constraints which are presented below as they are stated in Seidl (2001) after Selkirk (1996).

- i. NONRECURSIVITY: Phrases are not recursive (violable)
- ii. EXHAUSTIVITY: There is no skipping of the levels in the prosodic hierarchy (violable)
- iii. LAYEREDNESS: Lower levels cannot dominate higher levels (undominated)
- iv. HEADEDNESS: All parts of the prosodic hierarchy except the syllable must dominate something (undominated) (p. 20).

Generally speaking, these constraints are not included in the OT account of a language because these constraints are assumed to be respected. However, and since there are some cases where Nonrecursivity and Exhaustivity are violated, these two constraints can be included wherever there is a necessity for their inclusion, as we will see in the case of the Bantu languages to be discussed below.

### **2.3.3 The End-Based Mapping of the MaP Level within OT**

The following sub-sections discuss the main constraints used within the end-based to account for (the formation of) the major phonological phrase domains.

#### *2.3.3.1 Interface Constraints*

##### 1- Alignment Constraints

Selkirk (1995) defines a family of alignment constraints which define edges of prosodic constraints in terms of edges of surface syntactic structure and these constraints are known as the interface constraints. The following table shows the (surface) syntactic structures and the prosodic constituents defined in relation to them as it is illustrated in Truckenbrodt (1995).

*Table (2): The prosodic hierarchy*

Syntax	Prosodic Hierarchy
Utterance	Prosodic Utterance
Clause	Intonational Phrase
XP	(Major) Phonological Phrase
X0	Phonological Word

(p. 29)

Since I am working on the phonological phrase, I will only present below the constraints regulating the mapping of the phonological phrase.

##### - Phonological phrase ( $\phi$ )

- i. Align XP, R: Align (XP, R;  $\phi$ , R)
- ii. Align XP, L: Align (XP, L;  $\phi$ , L)

Align the right/left edge of every XP with the right/left edge of a phonological phrase.

However, and according to Truckenbrodt (1999), there is one general constraint *\*P-Phrase*. This constraint can render one or both of the (interface) alignment constraints inactive.

- *\*P-Phrase*: Avoid p-phrases altogether (Truckenbrodt, 1999, p. 228).

## 2- Wrap Constraint

The main achievement of Truckenbrodt (1995) is his introduction of *Wrap-XP* as a constraint of the syntax-phonology interface in addition to the family of alignment constraints assumed by Selkirk (1995) discussed above. The main motivation for Wrap-XP is to account for the case where a verb and its two complements are wrapped together onto one MaP ( $\phi$ ), a case which cannot be accounted for by the Align constraints.

- *Wrap-XP*:

Each lexically headed XP must be contained inside a  $\phi$  (Truckenbrodt, 1995, p. 81).

The Wrap-XP and Align-XP constraints are assumed in Truckenbrodt (1999) to be universal in that they are present in the grammars of all languages. Wrap-XP and Align-XP,R are in conflict when one XP is inside another and the best illustration of this is the case of VP with two complements. Wrap-XP, here, demands that an XP be contained inside of a phonological phrase whereas Align-XP,R requires the insertion of a  $\phi$  boundary after each XP.

- Align-XP,R is ranked higher than Wrap: [V XP] $\phi$  [XP] $\phi$
- Wrap is ranked higher than Align-XP,R: [V XP XP] $\phi$

To illustrate how both Align-XP,R and Wrap-XP interact in the grammars of languages, consider the following table taken from Seidl (2001) which shows some Bantu languages and the phonological constraints they violate.

**Tabelau (1)**

Language	[V NP NP] <sub>VP</sub>	Wrap	Align-XP,R	NonRec
Kimatuumbi	((V NP) $\phi$ NP) $\phi$			*
Chichewa	(V NP NP) $\phi$		*	
Chi Mwi:ni	(V NP) $\phi$ (NP) $\phi$	*		

(p. 63)

To account for the differences in phonological phrasing in these three languages, the constraints should be ranked in different ways and it goes as follows:

- Chichewa: Wrap-XP, Non-Rec>> Align-XP,R

**Tabelau (2)**

	[V NP NP] <sub>VP</sub>	Wrap-XP	Non-Rec	Align-XP,R
<b>Chichewa</b>	(V NP NP)φ			*

- Chi Mwi:ni: Align-XP,R, Non-Rec>> Wrap-XP

**Tabelau (3)**

	[V NP NP] <sub>VP</sub>	Align-XP,R	Non-Rec	Wrap-XP
<b>Chi Mwi:ni</b>	(V NP)φ (NP)φ			*

- Kimatuumbi: Align-XP,R, Wrap-XP >> Non-Rec

**Tabelau (4)**

	[V NP NP] <sub>VP</sub>	Wrap-XP	Align-XP,R	Non-Rec
<b>Kimatuumbi</b>	((V NP)φ (NP)φ			*

### 2.3.3.2 Markedness (Well-Formedness) Constraints

Despite the fact that some of the variations from the phrasing patterns predicted by the Align-XP constraints could be accounted for using the Wrap-XP constraint, there are some variations which cannot be accounted for depending only on the interface mapping algorithms. The main idea is that prosodic considerations of phonological weight (branchingness of different levels), rate and style of speech can sometimes affect the formation of the major phonological phrase. This idea is first indicated by Ghini (1993) and further developed within Selkirk (2000) and both studies are briefly discussed below.

However, and before going on to define the well-known phonological constraints, we need to consider the following. We need to distinguish two types of phrasal rules. On the one hand, we have phrasal rules whose domains are solely derived by considering the interface constraints, that is, Wrap and Align constraints. Seidl (2001) and Pak (2005) called this type of rules *Early rules* and domains of such rules are assumed to be small, and insensitive to phonological considerations of weight and speech rate.

On the other hand, there are phrasal rules which exhibit variations in the formation of phrasal domains, generally depending on the interaction between interface conditions and prosodic considerations, and in many such cases speech rate can be a decisive factor in deciding which one will override the other as it is explained below. Thus, these languages can have two domains, one mapped from the high ranking of the interface conditions over the well-formedness constraints in slow speech and another domain from the high ranking of prosodic considerations over the interface conditions in normal to fast speech. An illustrative case from Greek will be discussed below while putting OT grammar in practice. This is because prosodic considerations of weight are generally assumed to come into play in faster speech rates. Languages (or rules) with such grammars are languages with *late rules* as it is also indicated by both Pak (2005) and Seidl (2001).

**Table (3)**

	<b>OT account(s)</b>
<b>Type 1:</b> <b>Languages with Early rules</b>	<u>In both slow and fast speech rates:</u> Only Interface constraints shape phonological domains. ((Well-formedness constraints have no effect in shaping phrasal domains))
<b>Type 2:</b> <b>Languages with Late rules</b>	a. <u>In slow speech:</u> Interface constraints>> Well-formedness constraints b. <u>In fast speech:</u> Well-formedness constraints>> Interface constraints

Let us now go on to introduce the well-known phonological constraints on phonological phrasing. On the one hand, we have the phonological constraints defined in Ghini (1993) and these constraints are defined below.

- Phonological constraints on phrasing: Ghini (1993)
  - i. Uniformity: A constraint that entails that a string is ideally parsed into same length units (Thus, it can be understood as a weight balance constraint).
  - ii. Average weight: A constraint that prefers phrases consisting of two phonological words at an average rate of speech.
  - iii. Increasing units: A constraint that disfavours a phrasing that groups a decreasing number of clitic-groups at the end of a sequence.

Selkirk (2000), on the other hand, sets forth a theory of prosodic phonology which for the first time includes the notion of phonological weight (branchingness) which is absent in her earlier theory (Selkirk, 1995). In her analysis of the nature of the constraints on major phonological phrasing in English, Selkirk employs both interface constraints as well as purely phonological constraints on the output representations. Generally speaking, Selkirk (2000) defines the following phonological constraints which are size constraints on prosodic phrasing.

- Phonological constraints on phrasing: Selkirk (2000)
  - i. Binary Maximum (MaP): A major phrase may consist of at most two minor/accentsual phrases<sup>11</sup>.
  - ii. Binary Minimum (MaP): A major phrase must consist of at least two minor/ accentsual phrases.
  - iii. Binary (MaP): A major phrase consists of just two minor/ accentsual phrases (p. 244).

However, these phonological constraints can be ignored in very fast speech rates as phrases tend to be longer by incorporating more words.

To sum up this part, the OT grammar proposed within the end-based theory to account for the syntax-phonology interface in all new neutral sentences is one consisting of two sets: interface constraints and (performance) phonological constraints. (Most of) the possible phonological phrasing types, at least at the MaP level ( $\phi$ ), are the results of the interaction between some of these constraints.

#### *2.3.3.3 Prominence Constraints*

Before going on to illustrate how the interaction between interface constraints and phonological constraints can account for real data, I will throw here some light on another set of constraints that regulate prominence within the MaP.

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<sup>11</sup> Even though the phonological phrase is assumed within Selkirk (2000) to consist of minor phonological phrase/accentsual phonological phrase, the phonological phrase can also consist of phonological words, if no evidence for a level mediating between the phonological word and the phonological phrase is present. Within Ghini (1993), for example, and as indicated above, binarity is defined in relation to the phonological word as a weight unit, and this helps him to account for phonological phrasing in Italian.

1- In addition to the interface conditions defined earlier, Truckenbrodt (1995) introduces another set of constraints known as the stress-prosody alignment constraints, and as far as the MaP level is concerned, the relevant constraint is:

- Align-  $\phi$ :

Align ( $\phi$ , edge, H( $\phi$ ), edge)      edge-most ‘phrasal stress’ (p. 178).

(H=head). This constraint can be read as assign phrasal stress to the rightmost/leftmost phrasal constituent within a MaP.

2- Moreover, Truckenbrodt (1995) introduces a constraint on prominence and he chooses to call it *the prominence requirement of focus*.

- Focus:

If F is a focus and DF is its domain, then the highest prominence in DF will be within F (p. 180).

I want also to add three constraints regulating the effect of focus on phrasing. In general, focus can, in many languages, change the phrasing and its effect can be exclusively of two kinds: it can either introduce a p-phrase boundary to the right or left of focus or it can delete a p-phrase boundary so that no intervening MaP boundary exists between a focused constituent and the end of the sentence. Some studies have defined the re-phrasing caused by focus and state some of these effects in OT terms as Truckenbrodt (1995) while other studies just postulate these effects as general constraints as in Ishihara (2007). However, I will try to put all the possible effects of focus on (major) phonological phrasing in terms of OT constraints and thus we end up with two types of constraints:

- i. Focus-edge: A focused constituent introduces a  $\phi$  -boundary to its left/right
  - a. Align-Foc, R: Align (Foc, R;  $\phi$ , R) (This one is in effect in Chichewa as it is indicated by Truckenbrodt, 1995)
  - b. Align-Foc, L: Align (Foc, L;  $\phi$ , L)
- ii. Focus-to-end: Deleted all intervening MaP boundaries between a focus constituent and the end of the sentence.

### 2.3.3. 4 Summary

The following is a summary of the OT grammar determining surface phonological phrasings. We have here four sets of constraints. Set d) is of relevance only when a sentence is under narrow focus.

#### a) Interface Constraints

1. Align XP, L/R: Align (XP, L/R;  $\phi$ , L/R)
2. Wrap-XP: Each XP is contained in a phonological phrase

#### b) Phonological Constraints of Weight and Balance

1. Phonological constraints on phrasing
  - i. Binary Maximum (MaP): A major phrase may consist of at most two minor/accidental phrases or words.
  - ii. Binary Minimum (MaP): A major phrase must consist of at least two minor/ accidental phrases or words.
  - iii. Binary (MaP): A major phrase consists of just two minor/ accidental phrases or words.
2. Uniformity: A string is ideally parsed into same length units (balance).
3. Increasing units: Avoid phrases with decreasing number of clitic-groups at the end of a sentence.

#### c) Violable Constraints on Prosodic Domination

1. NONRECURSIVITY (Non-Rec): Phrases are not recursive
2. EXHAUSTIVITY: There is no skipping of the levels in the prosodic hierarchy.

#### d) Constraints Defining the Effects of Focus on Phrasing

1. Focus-edge:
  - i. Align-Foc, R: Align (Foc, R;  $\phi$ , R)
  - ii. Align-Foc, L: Align (Foc, L;  $\phi$ , L)
2. Focus-to-end: Delete all intervening MaP boundaries between a focus constituent and the end of the sentence.

### 2.3.3. 5 OT Grammar in Practice

In this section, we will illustrate how the interaction between some of the constraints mentioned above can account for surface phonological phrasings in Chichewa and Greek.

#### I. Chichewa:

##### a. Phrasing under wide focus

- Constraints employed: *Wrap-XP, Non-Rec , Align-XP,R*
- Constraints ranking: *Wrap-XP, Non-Rec >> Align-XP,R*

**Tableau (5)**

[V YP ZP] VP	Wrap-XP	Non-Rec	Align-XP, R
☞ a.( V YP ZP)φ			*
b.( V YP)φ (ZP)φ	*!		
c.((V YP)φ (ZP)φ		*!	

(Kager & Zonneveld, 1999)

As you can see, the surface phonological phrasing in Chichewa can be accounted for using only interface conditions, as the constraint system defined above does not include any phonological constraints.

##### b. Phrasing under narrow focus (focused verb with two complements: (V)φ(XP)φ(XP)φ

- Constraints employed: *Align-Foc(Truckenbrodt,1995),Wrap-XP, Non-Rec,Align-XP,R*
- Constraints ranking: *Align-Foc >>Wrap-XP, Non-Rec >> Align-XP, R*

**Tableau (6)**

[ V YP ZP] VP	Align-Foc	Wrap-XP	Non-Rec	Align-XP, R
a.( V YP ZP)φ	*!			*
b.( V)φ (YP ZP )φ		*		*!
☞ c.(V)φ (YP)φ (ZP)φ		*		

(Kager & Zonneveld, 1999)

As it is illustrated above the introduction of focus causes re-phrasing as the focused verb introduces a phrasal break to its right.

## II. Greek: A case of optional p-phrasing

In “A Dynamic Approach to the Syntax-Phonology Interface: A Case Study from Greek”, Revithiadou and Spyropoulos (2009) indicate that though Align-XP,R is the mapping algorithm for Greek, there is a preference for p-phrases to be binary specially in normal to rapid rates of speech. This optionality in phrasing conforms to the assumption of the existence of what Seidl (2001) and Pak (2005) call *late rules*, which are rules that tend to have two domains, one defined in relation to the syntax-phonology mapping and emerges in slow speech, and another defined in relation to prosodic considerations and emerges in faster speech. The following are the two possible phrasings in Greek for the sentence mentioned below as proposed by Revithiadou and Spyropoulos (2009).

### Example (1)

o	pános	ðÍni	efxés	me	kártes
the	Panos –NOM	give- 3SG	wish-ACC.PL	with	card- ACC.PL
‘ Panos sends wishes with cards.’ (p. 215)					

- Two possible phrasings

Revithiadou and Spyropoulos indicate that the surface phonological phrasings in Greek can be accounted for by the constraints *Align-XP,R* and *Binary Minimum MaP* (Selkirk, 2000) and that the two observed phrasing patterns namely (XP) $\phi$  (V YP) $\phi$  (ZP) $\phi$  and (XP V) $\phi$  (YP ZP) $\phi$  can be accounted for by ranking these two constraints differently as follows:

- a. Syntax-phonology mapping (end-based algorithm): At slow speech
  - Constraints ranking: Align-XP,R >> Binary Minimum MaP
  - Predicted phrasing: [o pános] $\phi$  [ðÍni efxés] $\phi$  [me kártes] $\phi$
- b. Prosodic weight considerations (binarity-based mapping): At normal to fast speech
  - Constraints ranking: Binary Minimum MaP >> Align-XP,R
  - Predicted phrasing: [o pános ðÍni] $\phi$  [efxés me kártes] $\phi$

## 2.4 The New Theory of Phonological Derivation by Phase

### 2.4.1 Introduction

*Phonological derivation by phase* is a new theory of the syntax-phonology interface assuming the current syntactic thinking and thus has the upper hand compared with its antecedents discussed previously in this chapter. This new theory of the interface grants a derivational way of thinking of the syntax-phonology interface.

The new theory of *phonological derivation by phase* is a theory couched within the framework of a more general theory of narrow syntax and syntax interfaces developed in Chomsky (2001) known as derivation by phase, the core assumption of which is that syntactic derivation proceeds in phases which have interface realities at both LF and PF. Briefly, phonological derivation by phase can be defined as the phonological consequence of *derivation by phase* (Chomsky, 2001) where the main assumption is that phonology and syntax - also semantics- are linked by a single cycle (the phase) and this is known as the *best-case scenario* (Chomsky, 2004)

The following sections will outline the basics of the theory of phases and MSO, the main assumptions assumed by the current phase-based theories of the interface, some of the interface theories developed within the phase framework, the advantages of having a phase-based account of the interface, and finally some of the problems the phonological phase theories have to tackle.

### 2.4.2 Phases and MSO: The Basics

Chomsky (2001) proposes a dynamic model of the relation between narrow syntax and the interface systems building upon the notion of the phase. Chomsky (2001) proposes that  $v^*$  and C are strong phase heads that initiate spell-out and that it is the complement of these phase heads (i.e., VP and TP respectively) that are sent to the semantic and phonological systems. The operation that ships the syntactic structure to the two interfaces is called spell-out and it applies in a cyclic way, resulting in multiple interface units.

The following are the two basic assumptions of the phase theory within Chomsky (2001)

1- The definition of phase

- a. Phase:  $v^*P$  and CP
- b. SO domain: VP and TP

2- The Phase Impenetrability Condition in its two versions

- a. Phase Impenetrability Condition : First version(PIC1)

The domain of H is not accessible to operations outside HP; only H and its edge are accessible to such operations (Chomsky, 2001, p. 13).

[Given structure [ZP Z ... [HP  $\alpha$  [H YP]]], with H and Z the heads of phases].

- b. Phase Impenetrability Condition: Second version(PIC2)

The domain of H is not accessible to operations at ZP; only H and its edge are accessible to such operations (Chomsky, 2001, p. 14).

[Given structure [ZP Z ... [HP  $\alpha$  [H YP]]], with H and Z the heads of phases].

#### **2.4.3 Main Assumptions within the Phase-Based Syntax-Phonology Interface Theories**

The following are some of the main assumptions assumed within the phase-based theories of the interface:

- ✓ CP and  $v^*P$  are phases at the clausal level
- ✓ Spell-out applies in a cyclic manner (MSO): Chomsky suggests that the syntax-phonology mapping takes place at various points in the course of the derivation rather than at a single point.
- ✓ Spell-out is the only interface operation connecting syntax and phonology.
- ✓ Spell-out domains are the only domains that phonology needs. This is the strong PDbP thesis within Samuels (2009).
- ✓ A (major) phonological phrase is created at each spell-out: a phonological phrase is a result of cyclic syntax-prosody mapping of SO domains onto prosody (Dobashi, 2004; Ishihara, 2007).

#### **2.4.4 Variations among Phase-Based Theories: Main Points of Departure**

Before proceeding any further, this part will dwell on the questions presented in the first chapter. The questions I consider as constituting the main points for the existing

variations found among many interface theories developed within the phase-based framework, as different theories adopt different positions in answering these questions. Some of these theories will be reviewed in the following section. The three questions are: *What exactly counts as a phase? What constitutes a domain of spell-out? Does the unit of spell-out correspond directly to a p-phrase?*

### 1-What Exactly Counts as a Phase?

The question that posits itself in the first place is *What exactly counts as a phase?* As it is indicated in Chapter 1, and for the majority of the cases, the definition of the phase is better kept intact namely, only  $v^*P$  and CP are defined as phases at the clausal level (Chomsky, 2001; Fox & Pesetsky, 2005). However, there are some deviations from this. Pak (2008), for example, assumes that only CP is a phase in Luganda and Huave. Specifically speaking, Pak (2008) proposes that CPs are phases in Luganda and Huave, while still allowing the possibility that  $v^*P$  and DP can trigger spell-out in other languages. Nevertheless, it seems more plausible to keep the definition of strong phases intact ( $v^*P$  and CP) and to develop some mechanism to account for the fact that in some languages we never see the effect of spell-out on the  $v^*P$  phase.

A related question to consider is, if the MaP is defined in relation to  $v^*P$  and CP phases by mapping the complement of a phase head (or the phase itself) onto a MaP, how can other levels of the prosodic hierarchy both above and below the MaP be derived? One answer to this question is indicated in Pak (2008), following Kratzer and Selkirk (2007). Accordingly, the prosodic word can be understood as the spell-out of lexical heads while the intonational phrase can be the spell-out of *comma phrase*. Samuels (2010), on the other hand, indicates that phasal domains can be identified at two levels: at the clausal level where we can have phase heads as  $v^*$  and C (Chomsky, 2001), and within words where we can have phase heads as  $n, \phi$  (Marantz, 2001).

The main idea seems that there can be different phase heads defining different phonological levels. For the most part,  $v^*P$  and CP can be assumed as being MaP-mapping phases. This is the position I take in this dissertation and I assume that the cross-

linguistic variations in MaP-domains formation is the function of a genuine spell-out mechanism.

## 2-What Constitutes a Spell-out Domain (SO Domain)?

Having unified the definition of what constitutes a phase at least at the MaP level, the prediction that immediately posits itself is that variations in deriving the MaP domain cross-linguistically should vary as per the criterion of what constitutes a spell-out domain in a language.

This prediction is borne out by the fact that there are broadly two definitions of what constitutes a spell-out domain. The first is the one assumed within the framework of Chomsky (2001) where CP and  $v^*P$  are defined as (strong) phases whereas the complement of each phase head, TP for the C phase head; VP for the  $v^*$  phase head, is defined as a SO domain. Many of the phase-based theories (Dobashi, 2004 and, Kratzer & Selkirk, 2007 among others) assume this definition of the phase and spell-out domain to account for some data.

The second definition of what can be a SO domain is proposed in Fox and Pesetsky (2005). Fox and Pesetsky assume that phases and SO domains are essentially the same:  $v^*P$  and CP, and such a proposal is adopted by Ishihara (2007) to account for major phonological phrasing in Japanese (see Chapter 3 for exact details and examples). In their approach, the phase *edge* position is relaxed, and the leftmost element is not excluded from the SO domain. It can move or stay in-situ and thus be a part of the SO domain. Also, a non-leftmost element can also move, provided all the elements on its left also move and maintain the order relation.

- I. Chomsky (2001)
  - a. Phase:  $v^*P$  and CP
  - b. SO domain: VP and TP
  
- II. Fox and Pesetsky (2005)
  - a. Phase:  $v^*P$  and CP
  - b. SO domain:  $v^*P$  and CP

However, it is worth mentioning that there exist some instances where there seems to be no traces of spell-out on the  $v^*P$  phase, which leads some linguists to believe that in some languages only CP is a phase. The conception of phase and spell-out domain<sup>12</sup> I follow in this work is the one within Chomsky (2001). Thus, the definition of what can be a spell-out domain will also be intact. To account for the cross-linguistic variation in *what constitutes a spell-out domain*, I assume the existence of a genuine spell-out mechanism. More specifically, I assume that the function of *what constitutes a spell-out domain* can sometimes vary depending on two interacting factors namely the type of spell-out applying and the timing of spell-out relevant. This question will be answered in some detail in Chapter 4.

### 3- Does the Unit of Spell-out Correspond Directly (Wholly) to a MaP?

There is no single answer to this question. This is due to the fact that different phase theories employ different mapping algorithms, indicating that variations in MaP formation can result from the fact that the unit of spell-out may/may not correspond directly to a MaP.

On the one hand, and within models assuming what is referred to as the *simplest theory* of prosodic spell-out, the entire spell-out domain will be mapped directly onto a phonological phrase. One such study is Ishihara (2007). Adopting the conception of phase and spell-out domain within Fox and Pesetsky (2005) where the phase and spell-out domain are the same, Ishihara (2007) assumes that the phase, as a spell-out domain, correspond directly onto a (major) phonological phrase.

On the other hand, and within models assuming the Chomskyan difference between the phase and spell-out domain, the spell-out domain does not correspond directly onto a phonological phrase. Such view is entertained in studies as Dobashi (2004), and Kratzer and Selkirk (2007). Dobashi (2004), on the one hand, argues that the unit of spell-out may not correspond to a p-phrase directly due to a linearization process. According to

---

<sup>12</sup> I assume the definition of phase and spell-out domain within Chomsky (2001) with one deviation namely the phase head mainly  $v^*$  belongs to its spell-out domain.

him, the initial element in the string defined by spell-out escapes the mapping onto a p-phrase and still remains accessible to the next spell-out. The rule Dobashi (2004) puts is:

- Spell-out sends a linearly ordered string to  $\phi$  except for the initial element in the string (Assembly Process, para. 9).

Kratzer and Selkirk (2007), on the other hand, have a different position as they suggest that it is the highest phrase within the spell-out domain of a phase that corresponds to a MaP in phonological representation.

- *The Highest Phrase Condition on prosodic spell-out (phrasing-based version)*  
The highest phrase within the spell-out domain of a phase corresponds to a prosodic major phrase in phonological representation (Kratzer & Selkirk, 2007, p. 106).

The question of whether a spell-out domain corresponds directly (wholly) to a MaP or not is one of the main issues my new spell-out-based account, developed in Chapters 3 and 4, is to deal with. The main assumption within the new account is that whether a spell-out domain will fully correspond onto a single MaP or whether it will correspond to MaP in parts is dependent on the type of spell-out applying to a spell-out domain, itself a function of a phase head as the locus of parametric variations.

In a nutshell, this part identifies the points of departure among existing phase-based interface theories and briefly sketches possible solutions which will be dwelled on in the following two chapters. This part, more particularly, identifies the main factors assumed in literature to account for variations in p-phrasing within existing spell-out-based theories. It has been shown that the two functions of *what constitutes a spell-out domain?* and *Whether the unit of spell-out corresponds directly to a MaP or not?* are decisive factors in determining variations in MaP-domains formation within the previous spell-out-based accounts explained above. It has also been proposed that a good theory of the interface is one that can address these two issues while pertaining a single definition of what can be defined as a spell-out domain cross-linguistically. The two factors of *what constitutes a spell-out domain* and *Whether a spell-out domain corresponds directly to a MaP or not* are, accordingly, better seen as functions of a complex spell-out mechanism.

## 2.4.5 Some of the Phase-Based Interface Theories

The following are the theories to be discussed in this section:

- 1- Seidl (2001): A hybrid model
  - 2- Ishihara (2007): A full spell-out theory: Entire spell-out domain = MaP
  - 3- a. Dobashi (2004)
  - b. Kratzer and Selkirk (2007)
- } Partial spell-out theories: Parts of spell-out domain = MaPs

### 2.4.5.1 Seidl (2001): A Hybrid Model

Seidl (2001) proposes a model of the syntax-phonology interface known as the Minimal Indirect Reference (MIR). What distinguishes her model from the prosodic hierarchy theory is that it allows reference to two levels rather than one, and thus it makes the prediction that it should be possible for a single language to have what she refers to as early and late rules where early rules boundaries do not necessarily coincide with late rules boundaries.

An important aspect of her interface theory is that it is a theory partially developed within the phase framework in the sense of Chomsky (1999) as she herself indicates. Seidl (2001) uses the notion of phases to account for the domains of what she calls early rules and indicates that phonological rules in some Bantu languages apply to domains of the phase, phase boundaries or edges of phases.

In the following, I will outline the main aspects of Seidl (2001).

#### A. The Basic Assumptions

The following are the basic assumptions within Seidl's theory:

- 1- The notion of *early vs. late rules*

As Seidl herself indicates, the notion of *early vs late rules* has its origin in Kaisse (1985). However, within Seidl's model of the interface, and unlike Kaisse's proposal, the main assumptions are:

- I. P1 or early rules are not simply the rules that apply to domains of c-command, but rather to domains of the phase<sup>13</sup>.

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<sup>13</sup> Seidl (2001) indicates that the main characteristics of early rules are: 1- they have smaller domains, 2- they show insensitivity to phonological considerations and 3- they apply early.

II. Also, Seidl proposes that P2 or late rules "are not only rules of fast speech, but rather that they are rules which apply after Morphological merger",<sup>14</sup> (Seidl, 2001, p. 27).

2- Rejection of the prosodic hierarchy but not the indirect reference assumption<sup>15</sup>.

### **B- The Minimal Indirect Reference (MIR)**

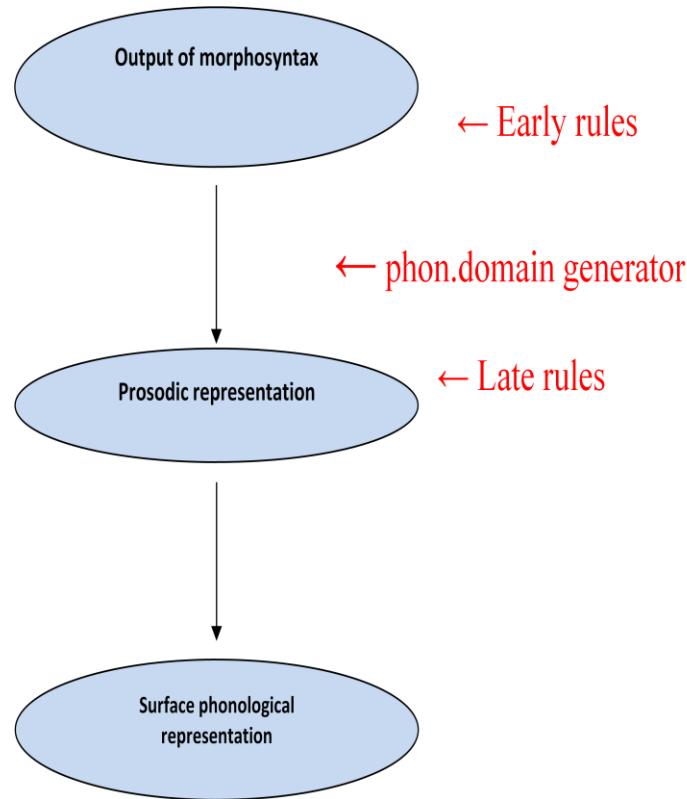
Assuming the existence of two kinds of rules, Seidl (2001) proposes a theory of the syntax-phonology interface known as the *Minimal Indirect reference* or *MIR*. The theory, as she herself puts it, is a *hybrid* of the indirect and direct reference theories in that it allows phonological rules to refer to two levels rather than one.

- I. A level of syntax (direct reference): Early rules apply to this parse.
- II. A representation consisting of phonological domains constructed from a level of syntactic structure (indirect reference): Late rules apply to this parse.

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<sup>14</sup> Seidl (2001) defines the following characteristics of late rules: 1- they have larger domains, 2- they can have two domains, one in slow speech mapped from syntax, and another in fast speech defined in relation to phonological factors, and 3- they apply late.

<sup>15</sup> Seidl indicates that her account of the syntax-phonology interface is "not a direct reference account because there is still a degree of specifically phonological variations in the interface" but the account is "different from previous indirect reference accounts in that it does not rely on a Prosodic Hierarchy. Rather ... there is no Prosodic Hierarchy above the word, or rather if there is one it has no role in the syntax-phonology mapping" (Seidl, 2001, p. 73).



**Figure (2):** The architecture of the grammar of MIR (Seidl, 2001, p. 21)

Broadly speaking, Seidl assumes the existence of two kinds of rules. The first kind is known as early rules and this kind of rules makes reference directly to morphosyntactic domains (M0). These rules can refer only to the phase (Chomsky, 1999) and are insensitive to non-syntactic factors. The other kind of rules she refers to are called late rules and these rules can make reference only to constituent structures composed of prosodic domains or what she calls P0 which are constructed from domains in which theta-roles are assigned. A theta domain is, according to her, the maximal projection of any head that assigns a theta-role. Seidl (2001) also proposes two edge rules for prosodic domain construction:

#### Edge rules

- (1) Either Left or Right edges of theta-domains project a corresponding boundary onto the prosodic plane.
- (2) An edge marking rule (LLL) inserts a boundary at the beginning of a sentence (p.76).

We are now in a position to consider an illustrative case of her model in practice. Seidl (2001) refers to two rules in Korean: /n/- insertion rule and OCP rule. The /n/- insertion occurs at the prosodic word juncture when a prosodic word ending in a consonant is followed by a prosodic word beginning with a high front vowel, whereas the OCP-motivated rule deletes a H-tone on a word when it is in the same domain as another word with a H tone.

According to Seidl, OCP rule is an early rule because

- (1) it applies within the domain delimited by the phase
- (2) and it has the same domain in both fast and slow speech.

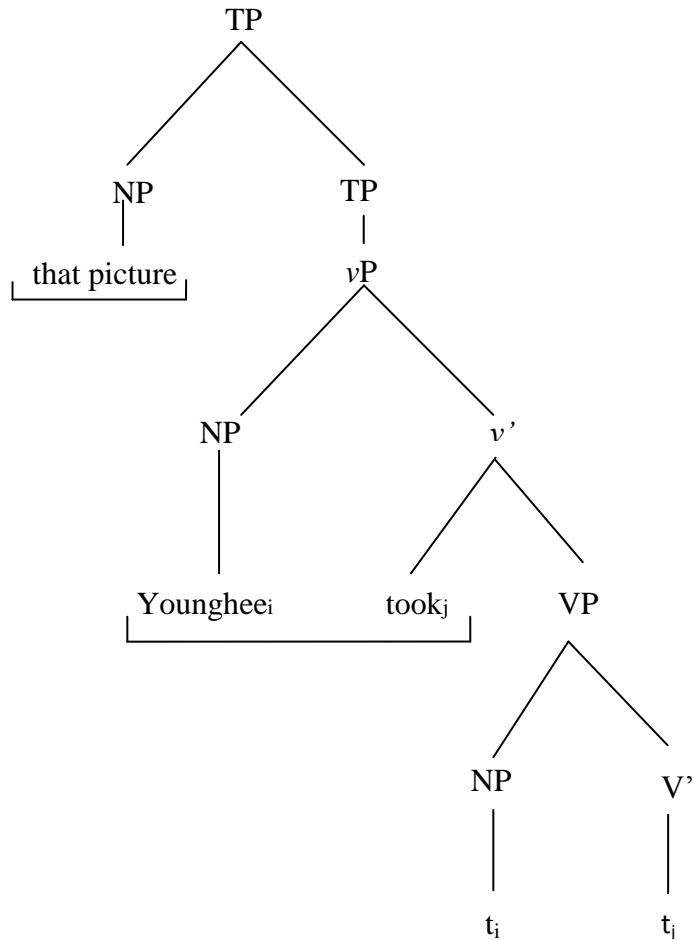
The rule, as Seidl indicates, does not apply between *that picture* and *Younghée* in the example below, though *that picture* has a H-tone and is followed by *Younghée* which also has a H tone. Seidl indicates that this is because they are in different domains since the adjunct *that picture* belongs to one phase whereas both the subject *Younghée* and the verb *took* belong to another phase and the rule can only apply within these domains.

Example (2)

**H      H**

Ki sacin-il    yanhi-ka    c'ik-as'- ta

(that picture) (Younghée took)    <== same p-phrasing in both slow and fast speech  
= Younghée took that picture (Seidl, 2001, p. 36).



(Seidl, 2001, p. 37)

/n/-insertion, on the other hand, is a late rule because it has variable domains depending on speech rate. Accordingly, /n/-insertion domains are prosodic domains constructed from the domains in which theta-roles are assigned and in fast speech these domains can be ignored. Seidl indicates that /n/-insertion applies in fast speech because in fast speech both *that picture* and *Younghesi* are phrased together and it does not apply in slow speech because *that picture* and *Younghesi* are phrased separately. Hence, we have two phrasings shown below:

- a) (that picture)(Younghesi took) In slow speech: theta-domains project L
- b) (that picture Younghesi took) In fast speech: theta-domains are ignored

The phrasing in a) can be accounted for by the two edge rules mentioned earlier and the additional condition of *In-situ rule for theta-domains*. Accordingly, Seidl proposes that the domains that theta-roles are assigned in are relevant to phonology only if the constituent stays in situ; hence only *Younghee* can project a boundary at the left edge of the domain in which it receives its theta-role in.

### C. Rules Accounted for via Phase

Seidl (2001) uses the notion of phases (boundaries or edges) to account for the domains of what she calls early rules. Specifically speaking, Seidl (2001) indicates that phonological rules in some Bantu languages apply to domains of the phase.

Seidl uses the left periphery of the phase as a domain for the application of the rule of PTI (phrasal tone insertion) in Kimatuumbi, whereas she refers to the phase as a domain for the application of the TP rule (H-plateauing) and all rules which make reference to syntax in Luganda, as well as for the OCP rule in Korean.

### D. A Shortcoming

As I indicated in the very beginning, the theory proposed within Seidl (2001) is but partially developed within the phase theory in that she refers to two types of syntactic information to define phonological domains, the domains of the phase and the theta-domains. However, the main assumption within the phase theory is that spell-out domains are the only domains that phonology needs. That is, all syntax-sensitive rules should be mapped from the phase as Kratzer and Selkirk (2007) put it "the phonological component should be fully integrated into phase-based spell-out" (p.132). My proposal is an attempt in this direction.

#### 2.4.5.2 Ishihara (2007)

Ishihara (2007) is also a phase-based theory developed to account for major phonological phrasing in Japanese. However, there are basically two differences between his theory and other phase-based theories discussed in this chapter.

- I. The first is that Ishihara (2007) is the only theory assuming the definition of phase and spell-out domain within Fox and Pesetsky (2005), and according to which a

phase and spell-out domain are essentially the same. Other theories discussed in this chapter are developed within the framework of Chomsky (1999, 2001).

- II. The second difference is mainly a difference between Ishihara (2007) and the theories of Kratzer and Selkirk (2007) and Dobashi (2004) discussed below. According to Ishihara (2007), the whole spell-out domain of a phase head (i.e., the phase) is mapped entirely onto a major phonological phrase.
  - Phases:  $v^*P$  and CP
  - SO domains:  $v^*P$  and CP (excluding adjuncts and A'-moved material).

(Ishihara, 2007, p. 146)

#### *2.4.5.3 Dobashi (2004), and Kratzer and Selkirk (2007)*

Both the theories of Kratzer and Selkirk (2007) and Dobashi (2004) assume Chomsky (2001). Moreover, the two theories entertain, more or less, the same kind of analysis in that they assume that the spell-out domain of a phase is not entirely mapped onto a MaP. Employing different implementations, both the theories succeed in accounting for some cross-linguistic data. Let us consider the two theories in some detail.

##### *2.4.5.3.1 Dobashi (2004)*

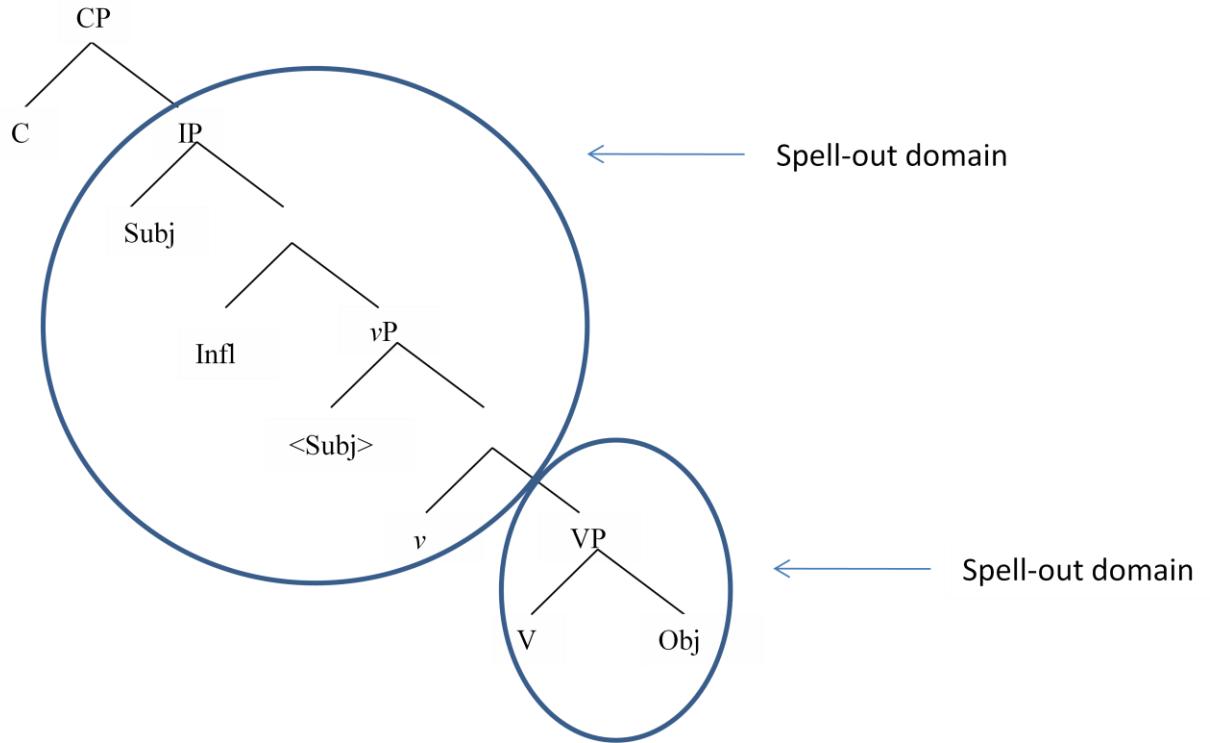
Dobashi (2004) is a theory of the syntax-phonology interface developed within the framework of Chomsky's phases and MSO theory. This theory is the first theory of the interface that argues that the unit of spell-out may not directly correspond to a p-phrase as the initial element in the string defined by spell-out escapes the mapping onto a p-phrase and still remains accessible to the next spell-out. The rule Dobashi puts is:

- Spell-out sends a linearly ordered string to  $\phi$  except for the initial element in the string.

(Dobashi, 2004, Assembly Process, para. 9)

The main motivation for this rule is what he calls the *Assembly Process*. The assembly process as he indicates is a linearization process according to which there should be a shared element between two linear strings (two units of spell-out) to ensure the linear order between these strings. Using what Dobashi refers to as the assembly problem, Dobashi succeeds in giving a logic for the rule mentioned above which in turns helps him to reach the default phrasing  $(S)\phi (V)\phi (O)\phi$  which is the same default phrasing predicted by the relation-based theory.

Employing the rule mentioned above, Dobashi accounts for phrasing in Ewe. Dobashi indicates that three kinds of spell-out apply to the structure [CP C [IP Subj Infl [<sub>vP</sub> <Subj> v [VP V Obj]]]], namely, to the sister of *v*, sister of C and to the root, resulting in the phrasing (S)φ (V)φ (O)φ.



Dobashi also derives the phrasing pattern (S)φ (VO)φ both syntactically and phonologically and as follows:

- I. Syntactically: The phrasing (S)φ (VO)φ can be derived from the default phrasing (S)φ (V)φ (O)φ by assuming the object movement to spec *v*\*P. He uses this account to predict the phrasing pattern (S)φ (VO)φ in Chichewa.
- II. Phonologically: Once again the phrasing (S)φ (VO)φ can be derived from the default phrasing (S)φ (V)φ (O)φ but this time the process is a phonological one. Dobashi indicates that in Italian, the basic phrasing is (S)φ (V)φ (O)φ, but there is an optional rule of leftward restructuring which restructures a non-branching object into the preceding MaP resulting in the phrasing (S)φ (VO)φ.

Hence, and unlike Seidl (2001), Dobashi (2004) assumes only one mapping algorithm for the interface, and deviations are accounted for by either referring to syntactic movements or non-syntactic factors.

- I. (S)φ (V)φ (O)φ: Default
- II. (S)φ (VO)φ: Derived (syntactically/phonologically)

Seidl (2001), however, seems a more compromising theory in that it assumes the existence of two mapping algorithms and assumes that variations in phrasings can mainly stem from

- I. the effects of these two different mappings,
- II. and secondly from the factors assumed by Dobashi namely syntactic movements and non-syntactic factors.

#### 2.4.5.3.2 Kratzer and Selkirk (2007)

Kratzer and Selkirk (2007) mainly studies transitive sentences in English and German. The account they develop still falls under the umbrella of the phase-based theory of the interface, as major phonological phrasing is still defined in relation to spell-out domains (Chomsky, 2001). However, they adopt a different mechanism from that used within Dobashi (2004) regarding the way a spell-out domain is mapped partially onto a MaP. According to them, it is basically the highest phrase within the spell-out domain of a phase that corresponds to a MaP.

- *The Highest Phrase Condition on prosodic spell-out (phrasing-based version)*  
The highest phrase within the spell-out domain of a phase corresponds to a prosodic major phrase in phonological representation (Kratzer & Selkirk, 2007, p. 106).

Let us consider how this condition works in all-new, neutral SVO sentences.

- ✓ Beginning with the lowest phase in the sentence, namely, the  $v^*$ -phase, spell-out on the complement of this phase which is VP, will parse the direct object as a MaP and thus it will get phrase stress.
- ✓ The verb, according to them, will be spelled-out segmentally but will not be parsed onto a MaP.

- ✓ Regarding the subject, the subject occupies a position within TP, namely, the specifier of *v* or T. Since TP is the spell-out domain of the C-phase and the subject is the highest phrase within this domain, it will be mapped onto a MaP and it will get phrase stress.
- ✓ Thus, the phonological structure we get is  $(NP_{Subj})\phi \ V \ (NP_{Obj})\phi$ . At this stage, the verb is not parsed as a part of a MaP but rather as a part of the intonational phrase. However, exhaustiveness as an ideal, will entail exhaustive parsing of the intonational phrase into prosodic constituents at the next level which is the MaP level and this will lead to one of the following:
  - I. Some languages may elevate the verb to the major phrase status, yielding the phrasing  $(NP_{Subj})\phi \ (V)\phi \ (NP_{Obj})\phi = (S)\phi \ (V)\phi \ (O)\phi$
  - II. Some languages may entail the adjunction of the verb to either the preceding or following major phonological phrase yielding the following two phrasings respectively:
    - a.  $((NP_{Subj}) \ V)\phi \ (NP_{Obj})\phi$
    - b.  $(NP_{Subj})\phi \ (V \ (NP_{Obj}))\phi$

The phrasings above are more or less the same as those predicted by Dobashi (2004). However, Dobashi (2004) uses the phrasing  $(S)\phi \ (V)\phi \ (O)\phi$  as a default and then derive the phrasing  $(S)\phi \ (V \ O)\phi$  both syntactically and phonologically.

Worth mentioning is that the theory developed by Kratzer and Selkirk (2007) represents a strong departure from direct reference readings of the interface. They assume a vital role for phonology in determining surface phonological structure in that the prosodic phrasing of the stray verb and other aspects are finally decided by phonology, and this is because “during spell-out only a partial phonological representation would be defined, precisely that which allows the satisfaction of the interface constraints on prosodic phrasing and stress” (Kratzer & Selkirk, 2007, p. 131).

The theory is therefore an indirect one and this is indicated by the authors themselves who make it clear that their theory of prosodic phrasing consists of “universal interface principles of prosodic spell-out ..., and, as part of phonology, an optimality-theoretic

ranking of prosodic markedness constraints, which operate to produce surface prosodic structures that are more nearly phonologically ideal. Within such a theory, language particular variation in prosodic phrasing would be the consequence of phonology: different language-particular rankings of prosodic markedness constraints could give rise to different alternations to the prosodic structure produced by the universal prosodic spell-out principles” (Kratzer & Selkirk, 2007, p. 126).

The last aspect of this theory to mention is that Kratzer and Selkirk (2007) recognizes three spell-out domains, unlike other previously mentioned theories. These three potential spell-out domains are: Topic P (the complement of C), TP (the complement of Topic) and VP (the complement of v).

#### **2.4.6 The Main Merits of Assuming a Phase-Based Theory of the Interface**

The phase-based account of the interface, as it will be shown below, is superior in many respects to its antecedent accounts (theories) of the interface discussed earlier in this chapter. The following are the main merits of assuming a phase-based theory of the interface.

##### *1- A Theory Developed within the Current Syntactic Theory*

The main merit of this theory is that it is a theory of phonological phrasing developed within the current theory of phases and multiple spell-out, as compared with the end-based or relation-based which are both based on the X-bar grammar.

##### *2- A Null Theory*

It is a null theory in that it does not impose any syntax-phonology mapping algorithm to form MaPs as compared with the end-based or relation-based theories. Spell-out is the only interface operation relating syntax to phonology whereby the unit of spell-out corresponds to a MaP (Dobashi, 2004; Ishihara, 2007).

### 3- A Derivational Theory

As its very name suggests, derivation by phase is a derivational theory resulting in the fact that phonology is induced in parallel with syntax. This has an advantage in that variations in phrasings can be accounted for

- a. Firstly: Syntactically (e.g., topicalization, syntactic movements)
- b. Secondly: Phonologically (phonological considerations)

Thus, the phase theory, as a derivational one, enables us to account for some variations resulting from *the derivational history of items*. Dobashi (2004), for example, assumes that the difference in phrasing between Ewe [(S)φ (V)φ (O)φ] and Chichewa [(S)φ (VO)φ] is a structural one namely whether the object moves (Chichewa) or not (Ewe). On the contrary, all previous indirect reference theories are just representational ones, *generalizing across X-bar categories* and thus including no derivational facts.

### 4- It Successfully Accounts for Cases Covered by Previous Indirect Reference Theories

Some of the phase-based theories succeed in accounting for languages and p-phrasing patterns covered by the end-based and the relation-based theories. Dobashi (2004), for example, succeeds in predicting the two patterns of phrasing predicted earlier by the relation-based and end-based theories for SVO languages and these two patterns are (S)φ (V)φ (O)φ and (S)φ (VO)φ respectively. Employing the phase framework and considering both pure syntactic factors as movements, and phonological restructuring, Dobashi (2004) succeeds in predicting the phrasing patterns in Chichewa, Ewe, Italian and Kinyambo (see Dobashi, 2004 for more details).

- The languages and phrasing patterns discussed within Dobashi (2004)
  - a. Ewe (S)φ (V)φ (O)φ
  - b. Chichewa: (S)φ (VO)φ
  - c. Italian: (S)φ (V)φ (O)φ or  
(S)φ (V O)φ if O is non-branching
  - d. Kinyambo: (S)φ (V O)φ or  
(S V)φ if S is non-branching (An Analysis of Phonological Phrasing, para. 2)

## *5- It Succeeds in Accounting for Rule Domains Which Correspond to the Domains of the Phase*

Assuming the phase notion, many interface theories succeed in accounting for the cases whereby phonological rules apply to transparent syntactic structure. As it is indicated below, phase-based theories succeed in accounting for some rule domains which correspond to (specific) domains of the phase.

- ✓ The phase itself: Pak (2008), for example, indicates that “there is a highly transparent mapping between CP phases and phonological domains” (Pak, 2008, p. 14) and she defines a phrasal tone rule from Luganda called H-Tone Anticipation (HTA) as an example of this case.
- ✓ The left periphery of a phase: This is the case with the rule of phrasal tone insertion (PTI) in Kimatuumbi discussed in Seidl (2001).

### **2.4.7 Existing Problems and Possible Solutions**

The following are the points that the phase theory should tackle if it is to fully account for the area of the syntax-phonology interface.

#### *1- Problem One: The Lack of a Generalized Pattern (Or the Mapping-Mechanism Problem)*

The main problem the phase theory has to tackle is to define a general framework that can handle existing variations among the phase-based interface accounts discussed earlier within a more integrated theory. As it has been indicated before, existing phase-based interface accounts vary as to both what should be considered a spell-out domain (Chomsky, 2001 vs. Fox & Pesetsky, 2005), and whether a spell-out domain should be fully defined onto MaP or not. Phonologically speaking, there is a need to put cross-linguistic variation in the formation of MaPs within a more generalized phase framework.

#### *✓ Possible Solution*

A possible solution to this problem is to keep the definition of phases and spell-out domains intact (Chomsky, 2001) and to attribute cross-linguistic variations in the output of spell-out to a variable spell-out mechanism. This is the view I propose and follow in this dissertation. The exact details of this mechanism will be defined in Chapter 4.

*2- Problem Two: The Single Mapping Problem ( No an Overall Coverage of All Possible Phrasal Domains)*

It is a well-known fact that MaP domains cannot be uniformly predicted by a single mapping algorithm. However, there is no single phase-based theory of the interface that takes the burden of accounting for variations in major (phonological) phrasing resulting from the existence of different interface mappings.

The end-based succeeds in accounting for variations in MaP formation by employing 3 interface mapping constraints, Align-XP, R, Align-XP, L and Wrap-XP. Thus, it seems plausible that the new phase theory must, in some way, include such mappings. Since spell-out is the only domain-defining (mapping) operation, these mapping constraints should be better seen as the functions of a variable spell-out mechanism and this is the view I assume and develop in this dissertation. This is not to deny the fact that variations in p-phrasing can vary according to languages specific syntactic facts (Dobashi, 2004), but I assume in line with Seidl (2001) that variations should, in the first place, be accounted for as resulting from the mapping process itself and secondly by assuming syntactic facts and phonological factors.

Existing phase theories are, however, of two kinds: either a theory that assumes a single mapping for all rule types and assumes variations to result only from syntactic movements or phonological effects (e.g., Dobashi, 2004) or a theory that, though assuming two mappings, is but partially developed within the phase framework as it defines only one of the mappings in relation to the phase domains (Seidl, 2001). However, there is a real need to have a phase-based interface approach equipped with different, though limited, mapping algorithms to account for variations in MaP domains formation.

✓ *Possible Solution*

As I indicated above, the best solution is to assume the existence of a spell-out mechanism which, though variable, is still predictable and limited. Chapters 3 and 4 will show how this spell-out mechanism can predict different MaP domain types.

### 3- Problem Three: A Direct vs. Indirect Reference Conception of the Interface

Generally speaking, the issue of the directness of the interface is still an unsettled one even within the new spell-out-based theories of the interface. Existing spell-out-based interface theories, hence, differ as to whether the spelled-out chunks should correspond directly to phonological domains for rule application or should they also undergo PF processing. Thus, and as far as the spell-out-based theory is concerned, two main conceptions of the interface do exist, namely 1-either to tie phonological rule application directly to spelled-out domains (direct reference account ) 2- or to assume that the spelled-out domains correspond to some prosodic structure to which phonological rules can then apply (indirect reference account).

The first position is taken by many phase-based theories as Samuels (2009), Kamali and Samuels (2008) and Narita and Samuels (2009) which all argue for a direct reference conception of the interface. Samuels's (2009) theory is known as *Phonological Derivation by Phase (PDbP)* and the claim of which is that “spell-out domains are the only domains that phonology needs” (Samuels, 2009, p. 249) and she refers to this claim as the *strong PDbP thesis*. According to her, the situation is better if PDbP is assumed since “phonology doesn’t have to ‘read’ syntactic boundaries; it just applies to each chunk as it is received” (Samuels, 2009, p. 250). Kamali and Samuels (2008) on Turkish is also a direct reference account built on the assumption that phonology and syntax operate on synchronized cycles. Moreover, Narita and Samuels (2009) is a more general direct reference analysis integrating the assumptions of both Chomsky (2001) and Uriagereka (1999). Surface phonological possibilities of phrasing are assumed here to be the result of syntactic variations including movement, islandhood and branchingness as a syntactic phenomenon.

On the other hand, the indirect reference conception of the interface is taken by some spell-out-based theories the main exponent of which is the theory of Kratzer and Selkirk (2007). Within this interface theory, spelled-out domains do not correspond directly onto phonological domains as they have to undergo phonological processing that decides the final surface phonological phrasing. This attitude is explicitly stated by them by making it clear that “within such a theory, language particular variation in prosodic phrasing would

be the consequence of phonology: different language-particular rankings of prosodic markedness constraints could give rise to different alternations to the prosodic structure produced by the universal prosodic spell-out principles” (Kratzer & Selkirk, 2007, p. 126). Thus, the MaP seems to be used in these theories as a representational level to which rules can apply and the main motivation for it is not difficult to guess it is the non-isomorphism problem. Moreover, in “Minimalist spell-out of prosodic major phrases”, Selkirk explicitly indicates that the version of the phase theory used in her account is indirect in nature as she assumes the existence of prosodic structure as well as a post spell-out component, and the reason she gives is that “there has to be a post-spell-out component in which phonological constraints on prosodic structure come into play, since it is known that phonological factors such as the length of constituents or their accentedness can influence surface prosodic structure”(n.d., para.6).

✓ *Possible Solution: A Hybrid Conception of the Syntax-Phonology Interface*

However, and in the midst of these contradictions, some moderate views do exist and they are found in theories as that of Seidl (2001) and Dobashi (2004) who, though assume that spell-out domains correspond to phonological constituents, they do not opt for a completely direct reference in that they assume that phonological considerations can, for certain languages or specific rules, determine phonological-domains formation. Specifically speaking, Dobashi (2004) assumes that phonological effects can result in restructuring in certain languages, while Seidl adopts a theory of minimal indirect reference allowing phonological factors to come to play only in specific rules applying within a late parser and these rules are termed *late rules*. Hence, both the theories allow a certain *minimal* amount of variability as resulting from phonological factors and the reason is made explicit in Seidl (2001), namely, owing much importance on phonology in accounting for cases of mismatches “is unnecessary and in fact creates a theory which is too powerful” (Seidl, 2001, p. 133). However, the main difference between these two theories lies in the fact that Seidl (2001) rejects the existence of a prosodic hierarchy in the realm of the syntax-phonology interface, while Dobashi (2004) still uses the prosodic labels p-phrase or  $\phi$ .

The view I pursue in this work is, and in line with Dobashi (2004) and Seidl (2001), a hybrid one as I assume that the spelled-out domains (wholes or parts) created by the spell-out mechanism are truly phonological domains to which phonological rules can directly apply, but at the same time, I also assume that phonological effects can result in restructuring in certain languages or for specific rules. This hybrid conception of the interface takes the shape of a *methodological point* in Seidl (2001) as she puts it that “Variation in domains between languages should first be assumed to be syntactic in origin, and only when phonological variation cannot be shown to have a syntactic explanation should a complication of phonological grammar be introduced” (Seidl, 2001, p. 73).

Hence, the assumption I pursue in this work is that variations in major phonological phrasing should, in the first place, be accounted for in ways maintaining a direct-spell-out view of the interface namely as resulting either from the mapping/spell-out itself or from languages specific syntactic facts (e.g., topicalization). The key aspect of my assumption is that understanding the complexity of the mapping can help us to account, not only for cross-linguistic variations in phonological phrasing, but perhaps for many cases of the so-called *mismatches* between syntactic structures and phonological domains.

#### **2.4.8 Summary**

To summarize, this chapter presents a general review on the main aspects and debated issues of the syntax-phonology interface. Relatively speaking, the phonological phase-based theory is a more optimal and superior theory of the interface, assumed within the current syntactic thinking. However, there is a need to develop a more general phase-based framework of the interface that has the power of integrating most of the existing variations. One question that raises itself at this point is that *if the new theory of phonological derivation by phase is to replace the end-based theory, should not this theory enjoy the merits of a simple OT grammar like that of the end-based?* This work is an attempt in this direction and we will see that the grammar developed in Chapter 5 of this dissertation has a greater coverage of existing variation, including many of the cases that either constitute a challenge for the end-based or are left unaccounted for.

## CHAPTER - 3

### Can a (Phase) Head Undergo Interpretation along with Its Domain?

#### **3.0 Statement of the Problem**

The question of whether a phase head can undergo interpretation along with its domain is a very challenging one as far as the syntax-phonology interface is concerned and the answer to this question is crucial for the account to be developed later in the next chapter. Generally speaking, it is assumed within Chomsky's DbP that both the head and edge of a strong  $v^*P/CP$  phase are not spelled-out with the complement as it is implied by the PIC itself in its two versions. This assumption has been taken too far to the extent that it is used to differentiate between CP and  $v^*P$  (also DP), on the one hand, and phases of the type  $xP$  ( $aP$ ,  $nP$ ,  $vP$ ) proposed by Marantz (2001), on the other, and according to which the interpretation of  $xP$  phases includes the phase head, while that of CP and  $v^*P$  does not (see Newell, 2008). The standard view thus is that a clausal phasal head (mainly  $v^*$ ) is assumed not to be interpreted with its complement so that it can still be accessible for selection and head movement.

However, and phonologically speaking, assuming that the verb universally moves to  $v^*$  plus the standard assumption that  $v^*$  as a strong phase head must not undergo interpretation along with its complement posits a problem for deriving the phonological phrasing where the verb is phrased together with its complement/s, which is a prominent one. In fact, there exist many (interface) studies and empirical data which allude to the issue that a (phase) head - mainly  $v^*$  - but usually not a specifier can undergo interpretation with its complement resulting in a p-phrasing where the verb ( $V-v^*$ ) and its complement/s are grouped together. In the following, I present some of such studies as well as the main possible accounts of the phonological grouping of the verb and its complement/s together. As it will be shown below, some of the studies account for the phrasing of the verb and object together, not by assuming that it is the  $V+v^*$  that undergoes spell-out, but rather by assuming that it is only the V that undergoes spell-out

while  $v^*$  remains behind which is really problematic assuming the universality of V-to- $v^*$  movement.

### **3.1 Possible Accounts for the Wrapping of the Verb along with Its Complement/s**

#### **3.1.1 Head Movement Does Not Occur in Narrow Syntax**

Chomsky (2000) suggests that head movement is a phonological operation taking place at PF. Consequently, if we go on to assume that V-to- $v^*$  movement is a phonological process and hence takes place after spell-out, then and at spell-out, VP including the verb will be spelled-out in the complement of  $v^*$ . Such analysis is entertained in studies as Dobashi (2004) who, following Chomsky (1995b) as he indicates, assumes that V-to- $v^*$  movement does not occur in narrow syntax<sup>16</sup>.

#### **3.1.2 Lack of V-to- $v^*$ Movement in Some Languages: Samuels (2009)**

Another possible explanation is that the verb does not move to  $v^*$  (or higher) in some languages, contra the assumption that the verb universally moves to  $v^*$ . Samuels (2009) assumes this to account for obstruent voicing in Korean where she indicates that “it is crucial here that the verb doesn’t move to  $v^*$  or higher” (Samuels, 2009, p. 331).

- a. The application of obstruent voicing between a direct object and a verb in Korean.  
According to her, “In order for the object and verb to be spelled out together in the matrix clause, it is important that the verb does not move too high: if it is in  $v$  or higher, the verb and object would be in separate clause-level domains (unless the object also raises)” (Samuels, 2009, p. 329).
- b. The non-application of obstruent voicing between a subject and a verb in Korean.  
This is because assuming the lack of verb raising, the subject will be spelled-out in the complement of C and the verb in the complement of  $v^*$ .

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<sup>16</sup> However, Dobashi does not employ this assumption to account for the verb and object being spelled-out together, he rather assumes that both the verb and the object are in the complement of  $v^*$  (i.e., the same spell-out domain) and that the verb escapes the mapping for linearization purposes, specifically, the verb is used to linearize two instances of spell-out by being a shared element.

One point to add here is that in one of her studies<sup>17</sup>, Samuels makes it explicit that variations in the p-phrasing of the verb can be the result of its position at spell-out. She assumes three positions for the verb during spell-out namely either in V, v or T.

### **3.1.3 Movement of the Object to a Higher Position (Spec, $v^*P$ ): A form of delayed spell-out**

- Dobashi (2004) on Chichewa

Despite the fact that Dobashi (2004) indicates that the default p-phrasing can be taken to be (S) $\phi$  (V) $\phi$  (O) $\phi$  where the verb and its complement are phrased separately, he also shows that the phrasing (VO) $\phi$  in some languages as Chichewa can be derivationally obtained from this default phrasing. The reason for obtaining this phrasing is that  $v$  in Chichewa has an OCC feature and thus the object moves to its Spec to check this occurrence feature resulting in the evacuation of the spell-out domain of  $v^*$  and thus spell-out applies only to the sister of C yielding a p-phrasing where both the verb and object are phrased together. Thus, the phrasing of the verb and its object (VO) $\phi$  can be accounted for in languages as Chichewa by the movement of the object to the Spec of  $v$  (plus the movement of  $v^*$  to T).

- Seidl (2001)

Seidl (2001) also has a similar prediction as she indicates that “arguments which are in situ are phrased separately from the verb and arguments which are not in situ at spell-out are phrased with the verb” (Seidl, 2001, p. 86).<sup>18</sup>

### **3.1.4 Uriagereka’s (1999) MSO Model**

One of the main predictions within Uriagereka’s (1999) MSO model is that heads and their complements are mapped together onto a single prosodic unit, but not heads and their complex specifiers.

- A Dependent Study: Sato (2009) on Taiwanese

In Sato (2009), the prediction within Uriagereka (1999) that a head is to be mapped together with its complement onto a single prosodic constituent is borne out. Using data

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<sup>17</sup> “From syntax to phonology: phi and phases”

<sup>18</sup> See Chapter 5 of Seidl (2001) on Bantu languages for exact details.

from Taiwanese, Sato shows that the head-complement configuration (V-NP<sub>object</sub>) licenses tone sandhi but not the head-specifier one.

Example (1) V-NP<sub>object</sub>

be● [lŋg●pun● chhe]

buy two-CL book

‘buy two books’ (Sato, 2009, p. 242 after Simpson & Wu, 2002)

### 3.1.5 Simpson and Wu’s (2002) Modified Model of CSO

The study of Simpson and Wu (2002) maintains the thesis that a phase head can undergo transfer with its complement as Simpson and Wu clearly put it that “the input to CSO is the inner ‘core’ of a phase <sup>19</sup> consisting of its head H and its complement YP, but critically not the phase’s outer phase-peripheral specifier XP” (Simpson & Wu, 2002, p.11). Specifically, they show that in Taiwanese spell-out applies to a head C [kong] and its complement IP and this is indicated by the very fact that the elements in the [C+IP] sequence undergo tone sandhi/TS modification and the application of the rule is indicated below by a dot symbol following the syllables undergoing TS.

*Syntactic creation of the inner core of a phase headed by C0 kong*



[ kong [IP/TP A-sin m lai ]]



*Spell-out of the inner core + application of tone sandhi rules:*



[ kong● [IP/TP A●-sin m● lai ]]



*Syntactic raising of the output of mid-derivational Spell-out → IP/TP raising to outer phase-peripheral Spec of the phase CP:*



[CP [IP/TP A●-sin m● lai ] i kong● ti ]



*Final syntactic form is pronounced (as immediately above)*

(Simpson & Wu, 2002, p. 11)

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<sup>19</sup> The phase intended here is CP and not v\*P.

Despite the fact that they assume, based on data from Taiwanese<sup>20</sup>, that only CP can be a phase, the main contribution of this study to the issue at hand is that they empirically demonstrate that both a phase head C and its complement IP constitute a single spell-out domain to the exclusion of the specifier as it is illustrated above. One interesting point which falls as a natural result of their assumption that only CP is a phase is that the verb along with its overt object (i.e., VO) can be spelled-out together in the complement of C when its inner core is submitted to spell-out as it indicated by the two examples to be discussed below which contrast the status of a topicalized versus a non-topicalized overt object in Taiwanese.

More to the point, Simpson and Wu do also employ the idea that only the inner core of a CP phase (C+ its complement) can undergo spell-out together, but importantly not the specifier, to account for the fact that the raised IP in *kong* sentences (as it is illustrated above), but not a topicalized object, can trigger TS in the head preceding it in the underlying form in Taiwanese. Their account assumes that IP raising in *kong* sentences does target Spec CP and hence when spell-out applies to CP (i.e., to C+IP) and before the Spec CP is created, the still in situ IP will trigger TS in the head C prior to its raising to its Spec. On the other hand, object topicalization does not target the Spec of CP, and consequently when the inner core of the CP phase is sent to spell-out, the topicalized object is not in situ and thus cannot trigger TS on the preceding verb (head) as it has raised though to a lower position within the inner core of the CP phase. The contrast between a topicalized overt object preceding the verb and triggering no TS in the verb, and a non-topicalized overt object following the verb and hence resulting in TS in the verb is shown below.

**Example (2):**

- |  |   |
|--|---|
| a. The case of a non-topicalized object<br>[goan. lau.pe] be. hiao. kong. tai.oan.oe | b. The case of a topicalized object<br>[tai.oan.oe]i [goan. lau.pe] be. hiao. kong ti |
|--|---|

I old-father not know speak Taiwanese  
'My father can't speak Taiwanese'

Taiwanese I old-father not know speak.  
'Taiwanese, my father can't speak'

(Simpson & Wu, 2002, p. 13)

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<sup>20</sup> As well as data from English.

### 3.1.6 A Featural Account: Ott (2011)

According to Ott (2011), a phase head, specifically C, can undergo spell-out along with its complement if it does not retain any interpretable feature after inheritance takes place<sup>21</sup> and he uses this assumption to account for the asymmetries between embedded interrogatives and free relatives (FRs). More specifically, Ott assumes the existence of two types of C, one is  $C_Q$  which does not get spelled-out along with its complement due to the presence of some interpretable feature Q<sup>22</sup>, and this type of C exists in embedded interrogatives resulting in the fact that embedded interrogatives *retain CP-hood across derivational cycles*, and the other is  $C_{FR}$  which undergoes spell-out along with its complement by virtue of having no interpretable feature and this type of C exists in free relatives and accounts for properties of FRs more generally.

### 3.1.7 A Different Interpretation of What Constitutes a Spell-out Domain: Fox and Pesetsky (2005)

Within Fox and Pesetsky (2005), a phase head ( $v^*$  and C) can undergo interpretation with its complement due to the assumption that a phase and a spell-out (SO) domain are the same.

- Fox and Pesetsky's (2005) definition
  - a. Phase:  $v^*P$  and CP
  - b. SO domain:  $v^*P$  and CP

➤ A Dependent Study: Ishihara (2007) on Major Phonological Phrasing in Japanese

Adopting the definition of phase and SO domain within Fox and Pesetsky (2005), Ishihara (2007) accounts for major phonological phrasing in Japanese. However, he employs a single addition to their definition. Accordingly, adjuncts and A'-moved elements should be considered as SO- external as indicated below.

- a. Phase:  $v^*P$  and CP
- b. SO domain:  $v^*P$  and CP (excluding adjuncts and A'-moved material) (Ishihara, 2007, p. 146)

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<sup>21</sup> Following Richards (2007), Ott (2011) assumes that feature inheritance dislocates only uninterpretable features from a phase head but not interpretable ones which, if present, will remain on the phase head.

<sup>22</sup> Thus, C remains visible for selection by the matrix predicate.

Employing the above-mentioned system of cyclic spell-out, Ishihara maps CP and  $v^*P$  (excluding adjuncts and A'moved elements) onto MaPs. Defining the MaPs boundaries, Ishihara (2007) successfully accounts for the correlation between semantic scope and prosodic phrasing, specifically, quantifiers and their scopes are claimed to be sensitive to MaP boundaries. The following are the two sentences, originally taken from Miyagawa (2003), Ishihara (2007) accounts for their scope by referring to their major prosodic phrasing created by direct and cyclic mapping of SO domains onto prosody (see Ishihara, 2007 for more details).

Example (3):

*Sentence (a): zen'in-gai ti sono tesuto-o uke-nakat-ta. (SOV)*

All-NOM that test-ACC take-NEG-PST

'All did not take that test.'

*Its Phrasing: only one phrasing pattern (unambiguous: all>> not)*

[<sub>TP</sub> zen'in-gai [<sub>vP</sub> ti sono tesuto-o uke-nakat-ta]]

( zen'in-gai )<sub>MaP</sub> ( sono tesuto-o uke-nakat-ta)<sub>MaP</sub>

*Sentence (b): sono tesuto-o i zen'in-ga ti uke-nakat-ta. (OSV)*

that test-ACC all-NOM take-NEG-PST

'That test, all didn't take.'

*Its Phrasing: Two phrasing patterns (ambiguous):*

a. (not >> all)

[<sub>TP</sub> sono tesuto-o [<sub>vP</sub> zen'in-ga ti uke-nakat-ta]]

( sono tesuto-o)<sub>MaP</sub> ( zen'in-ga uke-nakat-ta)<sub>MaP</sub>

b. (all >> not)

[<sub>CP</sub> sono tesuto-o i [<sub>TP</sub> zen'in-ga] [<sub>vP</sub> ti ti uke-nakat-ta]])

( sono tesuto-o)<sub>MaP</sub> ( zen'in-ga )<sub>MaP</sub> ( uke-nakat-ta)<sub>MaP</sub>

(Ishihara, 2007, pp. 139 & 149)

### 3.1.8 Spell-out of Maximal Projections (Eliminating the Escape Hatch): Svenonius (2001b)

A related account to that of Fox and Pesetsky (2005) is the one in Svenonius (2001b), as both tend to eliminate the escape hatch so that when an expression is sent to spell-out, “Not even its specifier or head are available” (Svenonius, 2001b, p. 8). However, and while Fox and Pesetsky’s account still maintains the standard assumption that  $v^*P$  and CP are phases intended for spell-out, Svenonius (2001b) allows the spell-out of maximal projections which are not strong phases.

Svenonius (2001b) is basically a phase-based account for the word order contrasts in impersonal passive constructions namely VO (participle-object) vs. OV (object-participle) orders. The innovation of this study lies in the fact that spell-out is triggered not by the construction of a strong phase but by the elimination of uninterpretable (unvalued) features on a phrase (not phase) itself and the rule he defines is *Evaluate X when it is complete* which is finally replaced by *Evaluate X as soon as possible*. This has the effect that spell-out happens both as soon as possible and as frequently as possible resulting in reduction of the amount of material in working memory, as he himself indicates.

However, the importance of his spell-out-based study to our subject lies in its consequences, that is, its giving evidence for some of the aspects of the proposal I handle in this chapter. Particularly, the following assumptions are of importance:

- I. The spell-out version developed in Svenonius (2001b) allows a maximal projection/phrase (not strong phase) to undergo interpretation along with its head if all unvalued features have been eliminated, specifically, a verb can undergo interpretation with the DP in the participle-object order in languages as Norwegian, where VP (VO) goes to spell-out early since it is bereft of unvalued features<sup>23</sup>. This in a way supports the observed phonological facts where the verb

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<sup>23</sup> Assuming the uninterpretable-feature criteria whereby an X cannot be spelled-out until all its uninterpretable (unvalued) features have been checked plus allowing the spell-out of phrases which are not strong phases, in addition to the assumption that V does not move to  $v$ , VP (VO) can accordingly go to spell-out early before the merger of  $v$  which accounts for the VO order in Norwegian.

in many languages tends to be phrased together with its object indicating that they are spelled-out together. Moreover, the notion of *phrase* (or maximal projection) used by Svenonius is also phonologically important in that it is generally assumed to be a unit defined by the syntax-phonology interface, specifically speaking, a (lexical) syntactic phrase corresponds to a (Major) phonological phrase within the prevailing end-based interface theory.

- II. Within Svenonius (2001b), the timing of when total elimination of unvalued features occurs is very crucial for accounting for the word order contrasts in impersonal passive constructions namely, VO vs. OV. Accordingly, Svenonius allows the following constituents to be spelled-out depending on the timing of the elimination of unvalued features:

- Norwegian: VP (very early, at the VP level)
- Swedish & English: vP (little bit late, at the vP level)
- Icelandic: CP (late, at the CP level)

The assumption of the early vs. delayed spell-out allows for the construction of small and large domains which can be phonologically important in that it allows for the construction of small and large phonological domains. This may have implications for the syntax-phonology interface in that may be (many of) the observed mismatches between syntactic and phonological constituents may turn out to be apparent ones, if we just have the right tool to handle them. In this dissertation, the notion of the timing of spell-out is employed within my new account though in ways that still adhere in many respects to Chomsky's phase theory (2000, 2001). Specifically speaking, I assume two optimal timing principles, namely PIC1 and PIC2, and that languages/cases can vary as to which one is in effect.

Before concluding, I want to indicate that the notion of spelling-out phrases (maximal projections) gets even reinforced in Svenonius (2001a) and formulated as below.

- A (*verb*) *phrase goes to Spell-out if:*
- (i) it no longer contains any unvalued features and
- (ii) its head has reached its final landing site (p. 8).

### **3.1.9 A Phonological Account: Kratzer and Selkirk (2007)**

Kratzer and Selkirk (2007) is a spell-out-based interface theory. To account for the fact that the verb and object are phrased together in English and German, they use the interface Highest-Phrase condition, as well as the assumption that the stray verb, which is assumed to be segmentally spelled-out, can be prosodically adjoined to a neighboring MaP, specifically to the MaP that follows it resulting in the phrasing ( V( NP<sub>obj</sub>) ) φ, and this accordingly happens after all “syntactic derivation and its multiple spell-out was complete” (Kratzer & Selkirk, 2007, p. 131). Thus, the adjunction, and hence p-phrasing, of the verb is to be decided by phonology.

### **3.1.10 A Perspective That Has the Phase as Its Hallmark: Gonzalez-Vilbazo and López (2012)**

The account developed here still falls under the umbrella of phases where a phase head is assumed to determine some interface features as prosody. However, this account is not derivationally justified. They just account for the difference in the phrasing of the verb and object in German and Spanish by arguing that the two languages have two different little *v*s with different specifications as to the p-phrasing of their complement (lexical) VP. More specifically, little *v* in German entails a phrasing as that predicted by Align-XP, R and little *v* in Spanish results in a phrasing as that predicted by Align-XP, L.

- a. German: (V XP)φ
- b. Spanish :( V)φ (XP)φ

### **3.1.11 Two Other Related (Interface) Studies**

The fact that a (phasal) head can (at least phonologically) undergo interpretation with its complement/s is also indicated by some other studies as Pak (2008) and Scheer (2007). The related predictions are summarized below.

- Pak (2008): In her dissertation, Pak (2008) indicates that, taking into consideration some phase-based proposals, the possibility of having a phase head grouped together with its complement can also be an option. Therefore and to account for the fact that some preverbal elements (negator, relativizer and other clause-initial items) in Huave

are grouped together with the following verb, Pak indicates in her footnotes the possibility that these elements are located in C and that the phase head C in Huave can undergo spell-out with its complement. Moreover, in her analysis of Luganda, she indicates that the verb can be phrased with either one or both of the objects<sup>24</sup> for the sake of the application of different rules but the implementations she uses to justify such phrasings are different. To account for the fact that the verb can be phrased with following complements, she assumes that only CP is a phase in Luganda and that the verb and following arguments are spelled-out in the complement of C, and to account for the fact that the verb can be phrased with only its first complement as a domain for the application of a certain other rule, she assumes that such domains are created by concatenation statements formed between heads and complements within spell-out domains.

- “A symmetric spell-out: heads remain uninterpreted (syntax)” while this is “Not really in phonology” (Scheer, 2007, p.11).

## 3.2 My addition

The new thesis I propose here is that a phase head mainly  $v^*$  can undergo spell-out along with its complement in some languages contra Chomsky (2001), especially if we assume the universality of V-to- $v^*$  movement. This thesis is empirically borne out by the cross-linguistic data and p-phrasing facts discussed in the previous section. I argue for this below by defining three conceptual motivations strengthening the notion that a phase head mainly  $v^*$  can be transferred along with its complement in some languages.

### 3.2.1 Conceptual Motivations

- i. First, if the main motivation for not interpreting a phase head with its complement, as it is assumed in DbP, is the fact that the phase head has to remain accessible for selection and head movement, then, the first intuition one can get is that once the phase head needs not be available for selection and head movement,

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<sup>24</sup> Accordingly, she shows that the verb and the first complement can be grouped together for the application of the rule of Low-Tone Deletion (LTD), while the verb can be phrased together with the following complements to form the domain for the application of the rule of H-Tone Anticipation (HTA).

it can undergo spell-out. The spell-out by PIC2 can guarantee the phrasing of the phase head ( $V-v^*$ ) with its complement via two assumptions: First, the delay of spell-out via PIC2 allows selection and head movement to take place and, second, since the domain of the lower phase has not been spelled out yet, then the head (after selection and head movement has taken place) can also undergo spell-out along with its domain.

This assumption seems to fare well with Chomsky's *simplest assumption* that "the phonological component spells out elements that undergo no further displacement -the heads of chains- with no need for further specification" (Chomsky, 2001, p. 13). The spell-out via PIC2 ensures this end, delaying spell-out of the phase head  $v^*$  until it is no longer needed to be accessed, allowing not only head movement to  $v^*$  but even the selection of  $v^*$  by T. More to the point, if the main motivation for the introduction of PIC2, in the first place, is the existence of empirical data from Icelandic allowing T to agree with the complement of V, then it is logical to go on and assume that (the delay via) PIC2, allowing selection between  $v^*$  and T to take place, should also be enabled to account for the phonologically well-attested phenomenon of phase head  $v^*$  (i.e.,  $V-v^*$ ) getting transferred with its complement, mainly if we adhere to the assumption that the cycle is one in syntax and phonology.

- ii. Second, the main motivation within Chomsky (2001) for not interpreting a phase head, mainly  $v^*$  along with its complement, is, and as it is indicated earlier, that the phase head should be accessible for selection and head movement. However, this motivation turns out to be a useless one by the Chomskyan framework itself. For one reason, head movement is finally defined as a phonological operation within Chomsky (2000), and for another reason, s-selection ends up as *dispensable* within the framework of Chomsky (2004). Thus, the motivation for the assumption that a phase head cannot undergo transfer along with its domain gets once again weakened.
- iii. Thirdly, the p-phrasing of the verb and object together via transferring them together in the lower phase turns out to be the optimal choice given Chomsky's

new assumption of feature inheritance (henceforth, FI) which conforms to the notion of the simultaneity of value and transfer as Richards (2007)<sup>25</sup> indicates. However, I go on and argue that to ensure the assumed value-transfer simultaneity, it is not only the verb that should undergo spell-out with other element/s in the lower phase  $v^*$  but the complex V- $v^*$ . That is to say, if the assumption of simultaneity is on the right track, then the phase head  $v^*$  should undergo spell-out along with its complement which, I assume, is the only way consistent with the assumption of the simultaneous valuation and transfer assumed within a phase theory as that of Richards (2007) specifically if we assume the verb movement to  $v^*$ . The main consequence of such assumption is the reduction of the edge accessibility to the edge itself. I argue for this below and I choose to begin by introducing the following two premises from Richards (2007).

- **Premise 1[Full interpretation]:** *Value and Transfer of uF must happen together*
- **Premise 2[Edge accessibility]:** *The edge and non-edge (complement) of a phase are transferred separately as implied by the PIC itself.* (p. 122)

Richards (2007) notices that premise 1 and 2 mentioned above are actually “at odd with each other” because while premise 2 (i.e., the PIC) “forces edge material (specifiers + head) to be transferred at the next phase level”, premise 1 “forces uF on the phase head (which is part of the edge)<sup>26</sup> to be transferred together with the rest of the completed phase” (p. 122). Specifically, the value-transfer-simultaneity assumption entails that uFs have to be spelled-out as soon as they are valued via Agree, because after valuation by Agree, they will have the same status as other *lexically valued features* and hence spell-out will not be able to distinguish them. His solution to this contradiction is to assume Chomsky’s FI system<sup>27</sup> whereby the uF must descend from edge to non-edge (i.e., from C to T and from  $v^*$  to V)

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<sup>25</sup> “On phases, Phase heads, and Functional Categories”.

<sup>26</sup> Here, Richards assumes that  $v^*$  and C are locus of uFs, following Chomsky’s OP and subsequent work.

<sup>27</sup> According to Richards (2007), the rationale for feature inheritance is that it is enforced by the way deletion happens, specifically, the non-phase heads exist only to act as *feature-receptacles* so that the valued uF do not end up hanging in the edge.

and since *the valued uF cannot survive into the next phase level* only PIC1 is consistent with the rationale of feature inheritance. Notwithstanding the fact that PIC2 is empirically well-grounded, PIC2 thus ends up *incompatible* with Chomsky's FI system as Richards (2007) indicates.

As far as the phase head  $v^*$  is concerned, I assume that the two premises mentioned above are at contradiction whether we assume DbP or OP and this is due to the fact that  $v^*$  is the locus of uF in both versions and that FI is of no importance if the verb finally ends up in  $v^*$ , the edge<sup>28</sup>. To elaborate, Agree features (uF) on  $v^*$  cannot be transferred at the phase  $v^*$ , because PIC1 ensures that  $v^*$  stays behind when its complement VP is spelled-out and this violates the requirement that  $v^*$ 's uF be transferred at the point when it is valued (by the object in VP)<sup>29</sup>. Hence, I propose that the only way to tackle the problem of simultaneity via (a slightly modified) PIC1 is to allow the phase head  $v^*$  or to be more precise the complex V+ $v^*$  to be spelled out in the lower phase rather than the verb only and thus to reduce the edge accessibility to the edge itself. This can be ensured and should be allowed as it is indicated in II above if one dispenses with s-selection.

Summarizing, the discussion above is neither for nor against FI as all my analysis will still build on Chomsky's DbP. The idea I want to defend here is that if simultaneity of valuation and transfer to which FI conforms is really a

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<sup>28</sup> This can in a way account for the fact that for the most part it is  $v^*$  which can be spelled-out with its complement but hardly C. This is due to the fact that  $v^*$  is spelled-out with its complement because valued uF are spelled-out on it both within DbP (as the locus of uF) or within the feature inheritance framework (due to V-to- $v^*$  movement) to ensure simultaneity. Conversely, the valued uF are not spelled-out on C and this is because it is not the locus of uF within DbP (but T), and not even within the feature inheritance as its uF are downloaded to T.

<sup>29</sup> Same problem is mentioned within Gallego (2010) and first discussed in Epstein et al.(2008). Accordingly, the assumption within Chomsky's feature inheritance that phi-features must leave the edge (the phase head) to the complement for deletion, does not make the right prediction if the verb (the locus of phi-features after feature inheritance) ends up in  $v^*$  (i.e., the edge) after V-to- $v^*$  movement contra feature inheritance as the valued phi-features on the verb appear outside VP, that is, "the uF-bearer(s) appear outside the deletion domain" (Gallego , 2010, p. 69).

requirement, then, and specifically for the case of  $v^*$ <sup>30</sup>, it can only hold by allowing the phase head to undergo spell-out with its complement via PIC1.

One point to add here is that I will not pursue this kind of analysis in my work as I assume the coexistence of PIC1 and PIC2 as two optimal options available by the grammar and I thus do not adhere to the notion of the value-transfer simultaneity. Specifically, assuming Chomsky (2001), I believe that the spell-out of the verb (i.e.,  $V+v^*$ ) with other elements in the lower phase can be attained via both PIC1 and PIC2. PIC1, on the one hand, ensures the transfer of a phase head  $v^*$  along with its domain iff one assumes the irrelevance of s-selection (Chomsky, 2004) and only for languages in which the verb does not move beyond  $v^*$  (and thus conforms to the value-transfer-simultaneity assumption<sup>31</sup> which I do not follow here). PIC2, on the other hand, can ensure the spell-out of a phase head  $v^*$  along with its domain for languages with V-to- $v^*$  movement, even if one still adheres to Chomsky (2001) where s-selection is of relevance, as the delay via PIC2 ensures both head movement and selection between T and  $v^*$  as I indicate above. However, I will not follow this analysis in relation to PIC2 and this is because I do assume the elimination of s-selection within Chomsky (2004). Since PIC2 induces a delay anyway, I assume that PIC2 can be used only to account for languages in which the phase head  $v^*$  undergoes late spell-out along with its domain in languages with syntactic movement to T (and hence spell-out via PIC2 does not seem to be governed by the requirement of the value-transfer simultaneity). PIC1, however, and as defined above, can account for languages in which  $v^*$  undergoes early spell-out along with its domain in languages where the verb does not move beyond  $v^*$  (conforming to the valuation- transfer simultaneity).

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<sup>30</sup> Due to V-to- $v^*$  movement.

<sup>31</sup> However, and before to conclude, one can mention a case where PIC1 does not obey the value-transfer-simultaneity. This is the case whereby the object in the  $v^*$  domain undergoes early spell-out in the  $v^*$  phase via PIC1 while the  $V-v^*$  remains behind and this case hence still follows the Chomskyan classic assumption that both the phase head and edge belong to the next phase domain and hence predicting the phrasing whereby the verb ( $V+v^*$ ) and object are phrased separately due to their being transferred in different domains.

### 3.2.2 The New Proposal

#### - A Brief Introduction

The theoretical framework assumed here is mainly Chomsky (2000, 2001). Moreover, I will also employ the assumption of the elimination of s-selection assumed within Chomsky (2004) in my analysis. The new account developed in this whole part builds on the following assumptions:

- a) A new thesis: The phase head  $v^*$  (also C) belongs to its spell-out domain contra Chomsky's DbP and subsequent work.
- b) A new spell-out mechanism: Two interleaving factors<sup>32</sup>
  - i) The role of head movement as a syntactic phenomenon (contra Chomsky, 2000).
  - ii) Phase heads as the loci of parametric variations
- c) Both PIC1 and PIC2 can be optimal.

The new thesis a) above has already been introduced earlier in this chapter. Before going on to briefly discuss the new spell-out mechanism b) above, I will deal with the two factors i) and ii) defined above, and upon which the new mechanism is to be finally based.

#### 3.2.2.1 Head Movement and Its Role

The assumption here is that if a phase head is to undergo spell-out along with its domain in related languages<sup>33</sup>, it must be ensured that this phase head needs no longer be available for head movement, and in Svenonius' terms it must have reached *its landing site*. I assume here that the fact that a (phase) head needs no longer be available for syntactic head movement is ensured via PIC1 for languages with V-to- $v^*$ , while it is ensured via PIC2 for languages where the verb moves to T (or beyond).

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<sup>32</sup> This new spell-out mechanism will be discussed in greater detail in Chapter 4.

<sup>33</sup> Languages in which the matrix of a phase head say  $v^*$  includes the instruction that the phase head undergoes spell-out with other elements in its domain. This view builds on the assumption that phase heads are the loci of parametric variations and this view will be very briefly discussed in this chapter though it will be defended and developed in the next chapter.

In the following I present the two versions of the Phase Impenetrability Condition or PIC within Chomsky (2001).

### I. Phase Impenetrability Condition: First version(PIC1)

The domain of H is not accessible to operations outside HP; only H and its edge are accessible to such operations (Chomsky, 2001, p. 13).

### II. Phase Impenetrability Condition: Second version(PIC2)

The domain of H is not accessible to operations at ZP; only H and its edge are accessible to such operations (Chomsky, 2001, p. 14).

[Given structure [ZP Z ... [HP α [H YP]]], with H and Z the heads of phases].

As it is indicated earlier while discussing the conceptual motivations for interpreting a phase head along with its complement, only PIC2 can spell-out the fact that  $v^*$  can be finally interpreted with other elements in its domain in languages with V-to- $v^*$  movement if one still assume the necessity of selection between  $v^*$  and T. PIC2 delays spell-out incorporating more structure, specifically T, allowing not only head movement up to  $v^*$ , which is also ensured by PIC1, but also selection between T and  $v^*$ , if it ever counts. However, and as I indicate earlier, s-selection gets eliminated within Chomsky (2004) and this has some welcome results which are defined below.

1. The first welcome result is that it allows PIC1, rather than PIC2, to spell-out the fact that the verb (V- $v^*$ ) in languages with V- $v^*$  movement as English can be spelled-out with other elements in its domain resulting in a phonological domain of the type (VO)φ, mainly if one assumes that the phase head belongs to the spell-out domain of the phase it heads.
2. The second result is that dispensing with s-selection allows us to account for the phrasing (VO)φ in languages with  $v^*$ -to-T movement. This is because PIC2 is the only delaying candidate available and this candidate can only ensure s-selection between  $v^*$  (V- $v^*$ ) and T but not between T (V- $v^*$ -T) and C. Thus, and to be able to account for languages with  $v^*$ -to-T movement and a (VO)φ phrasing pattern via PIC2, dispensing with s-selection is a good option to pursue. Generally speaking, to account for languages with  $v^*$ -to-T movement and a p-phrasing of the type (VO)φ,

different solutions raise themselves of which dispensing with s-selection (Chomsky, 2004) is the cheapest. These solutions are :

- I. Only CP is a phase: Hence, (VO) gets mapped in the complement of C, but not the subject, either because it is in Spec, CP or because it escapes the mapping for some reason say linearization (Dobashi, 2004).
- II. However, if we still assume the phasehood of  $v^*$ , then we have the following two options:
  - a. To continue with Chomsky's (2001) assumption that  $v^*$  and T are the locus of uF, but dispense with s-selection (Chomsky, 2004).
  - b. Selection can be pertained by looking at the label of the (slided) phase in conformance with a view as that of Boeckx and Grohmann (2004)<sup>34</sup>.

Dispensing with s-selection, I will show now that while PIC1 spells-out the case where a phase head  $v^*$  in languages with V-to- $v^*$  movement as English undergoes transfer along with its domain resulting in a form of early spell-out, PIC2 spells-out the case where a phase head  $v^*$  in languages with  $v^*$ -to-T movement<sup>35</sup> as Chichewa (Dobashi, 2004) undergoes transfer along with its domain leading to a form of late spell-out.

- i. PIC1 spells-out the case where a phase head, in languages with V-to- $v^*$  movement, undergoes transfer along with its domain resulting in a form of early spell-out.
- ii. PIC2 spells-out the case where a phase head, in languages with  $v^*$ -to-T movement, undergoes transfer along with its domain leading to a form of late spell-out.

#### A. PIC1 & Languages with V-to- $v^*$ Movement

In this sub-section, I will consider the case of languages with V-to- $v^*$  movement and a p-phrasing whereby the verb is grouped together with other element/s in its domain. An illustrative case can be English. English is defined within the framework of Selkirk

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<sup>34</sup> They assume that the "Head accessibility could be achieved by just looking at the phase-label, not below it, since the label is a copy of the head. That would work for selection. If furthermore head-movement is not part of CHL, then there is no need to look below the label, i.e. Spec should be inaccessible" (Boeckx & Grohmann, 2004, p. 6).

<sup>35</sup>  $v^*$ -to-T movement results in a phase sliding (Gallego, 2010).

(2000) as a language with the p-phrasing whereby the verb is grouped with its two complements onto a single MaP. Selkirk accounts for this phrasing as being a consequence of interface constraints<sup>36</sup> which define phonological domains in relation to syntactic constituents and these two constraints are Align-XP,R and Wrap-XP, entailing that the verb be mapped with either one or two of the phrasal complements in its domain respectively. Despite the fact that these two constraints are out of use by some linguists as constraints developed within the X-bar theory, the effects ensured by them should still be predicted within the new theory of MSO but this time in a derivational way, specifically as a function of the spell-out process itself. I assume that the spell-out process in English is regulated by PIC1 as the verb moves only up to  $v^*$ <sup>37</sup>. Thus, spell-out applies and the  $V-v^*$  will be included in the lower domain resulting in a p-phrasing where the verb or  $V-v^*$  and object/s are defined onto a single domain. As regards edge accessibility, I assume that the edge (specifier and adjoined materials) will remain accessible (though I do not assume this accessibility to fall from the head accessibility). The following are the constraints used within Selkirk (2000) to account for major phonological phrasing in English:

1- Interface constraints

I- Wrap-XP (the verb and its two complements are phrased together)

II- Align-XP, R (the verb and first complement are phrased together)

2- Phonological constraint

Binary (MaP): A major phrase consists of just two minor/accidental phrases.

**Tableau (1): The tableau is for the sentence *She loaned her rollerblades to Robin***

	Wrap-XP	AlignXP,R	BinMap
[She [loaned] [ her rollerblades]NP [to Robin]PP ]			
☞ (She loaned her rollerblades to Robin)MaP		*	*
☞ (She loaned her rollerblades)MaP (to Robin)MaP	*		*
(She loaned)MaP ( her rollerblades)MaP (to Robin)MaP	*		**!*
(She loaned)MaP ( her rollerblades to Robin)MaP	*	*!	*

<sup>36</sup> Interface conditions are now reduced to spell-out (mapping) instructions by a phase head as it will be discussed soon.

<sup>37</sup> However, the phrasing (VO) $\phi$  in English can still be attained if one argues that English lacks of V-to- $v^*$  movement as some linguists have proposed and in which case PIC1 will still be the one in effect in the mapping process.

(Selkirk, 2000, p. 245)

### B. PIC2 & Languages with $v^*$ -to-T Movement

Let us now turn to the case of languages with  $v^*$ -to-T movement and a p-phrasing whereby the verb is grouped together with its domain. PIC2 or to be more accurate the delay via PIC2 should, and as the only available delaying candidate within Chomsky's DbP framework, ensure and account for the fact that the verb can be grouped together with the object by being transferred together in the same domain within the lower (slided) phase in related languages with  $v^*$ -to-T movement. A possible example can be Chichewa which is defined within the framework of Dobashi (2004) as a language with  $v^*$ -to-T movement and a p-phrasing whereby the verb and object are mapped together onto a single MaP as it is shown below.

- ✓ *Interface constraints used to account for major phonological phrasing in Chichewa (see Truckenbrodt, 1995 for more details)*

I- Wrap-XP

II- Align-XP, R

The ranking system is Wrap-XP >> Align-XP, R and the following tableau accounts for the p-phrasing pattern observed in mono-transitive sentences.

**Tableau (2)**

[V NP]VP	Wrap-XP	Align XP,R
a. (V)φ ( NP)φ	*	
b. <del>NP</del> (V NP)φ		

I do propose here a re-analysis of Dobashi's (2004) account of the spell-out process in Chichewa and the consequent major phonological phrasing. I do assume the following:

*PIC2 and  $v^*$ -to-T languages:*

- ✓ Head movement: The delay via PIC2 allows  $v^*$ -to-T movement to take place → Following Gallego (2010),  $v^*$ -to-T movement results in phase sliding (or may be, phase extension as some linguists assume).
- ✓ Spell-out: I do assume that the verb (V- $v^*$ -T) can be spelled-out in the lower phase by the merger of C within the domain of the slided  $v^*$ P via PIC2 → This conforms to

Chomsky's simplest assumption that phonology spells-out elements that undergo no further movement.

The assumptions above can help us to reach a re-analysis of Dobashi's (2004) account for deriving the phrasing (VO) $\phi$  in Chichewa for the following sentence.

#### Example (4)

Mwaána      anaményá    nyúumba

child            SM-hit        house

(         ) $\phi$     (                  ) $\phi$

'The child hit the house' (Chichewa, para.1)

Assuming the phrase structure: [CP C [IP child hit-v-Infl [vP house <v> [VP <hit> <house>]]]], Dobashi's analysis stands on the assumption that the verb and object gets spelled-out together in the complement of C due to the evacuation of the lower phase domain (as a consequence of the object movement to Spec, v\*P to check the OCC feature of v\* as well as the v\*-to-T movement). Moreover, and to account for the fact that the subject does not get spelled-out with the verb and object in the complement of C, Dobashi proposes that the subject escapes the mapping due to a linearization issue, and is finally spelled-out when transfer applies to the root. Worth mentioning is that spell-out in his analysis is assumed to happen via PIC1.

✓ *Dobashi: Spell-out via PIC1*

[CP **C** [IP child hit-v-Infl [vP house <v> [VP <hit> <house>]]]]

- 
- 1- Spell-out the sister of C via PIC1 with the Subj escaping the mapping = (VO) $\phi$
  - 2- Spell-out applies to the root (C Subj) $\phi$

My re-analysis, however, does not postulate any such a linearization issue. The idea here is that the v\*-to-T movement results in a delay in spell-out via a phase sliding and thus by the merger of C, the v\*-T (by my new thesis that a (slided) phase head can be spelled-out with its domain) can now undergo spell-out within the lower (slided) phase via PIC2, the subject, on the other hand, is spelled-out when spell-out finally applies to the root. Hence, the main assumptions are:

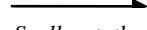
- i. My assumption that a (slided) phase head can be spelled-out with other elements in its domain.
- ii. My assumption of the role of head movement in delaying spell-out: A phase head can be spelled-out with other elements in its domain iff it has reached its final landing site and this fact is ensured for  $v^*$ -to-T languages via PIC2. Head movement in  $v^*$ -to-T languages results in a phase sliding (Gallego, 2010)

✓ *Re-analysis: Spell-out via PIC2*

[CP C [IP child hit-v-Infl [<sub>vP</sub> house <v> [VP <hit> <house>]]]]



1- *Spell-out the lower slided phase (along with its head) = (VO)φ*



2- *Spell-out the domain of C= (Subj)φ or (C Subj)φ*

As it is shown above, the assumptions above help us to reach a derivational account for major phonological phrasing in Chichewa. The effects of the interface constraints: Wrap-XP and Align-XP,R do now attain a derivational flavor as being consequences of the spell-out mechanism itself.

To wrap up, I assume that a phase head  $v^*$  in the configurations V-  $v^*$  and V-  $v^*$ -T can undergo spell-out with its domain via PIC1 and PIC2 respectively. More specifically, the delay via PIC2 allows  $v^*$ -T movement to take place. This view finally conforms to Chomsky's (2001) *simplest assumption* that phonology can spell-out elements (and thus heads) which undergo no further movement. Add to this, the assumption of phase sliding, that is, “V-movement is a device to redefine syntactic boundaries” (Gallego, 2010, p. 142)<sup>38</sup>, which raises the possibility that “(some instances of) head movement have an effect on the way syntactic domains are transferred” (Gallego, 2010, p. 51)<sup>39</sup>.

- V-to- $v^*$
- V- $v^*$ -to-T → phase sliding (Gallego, 2010) → incorporating more structure

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<sup>38</sup> Gallego here assumes and indicates that the process of phase sliding is an update on Chomsky's (1986a) assumption that “V-movement is a device to redefine syntactic boundaries” (Gallego, 2010, p. 142)

<sup>39</sup> Gallego here refers to the effect of the phase sliding resulting from  $v^*$ -to-T movement.

### 3.2.2.2 Phase Heads as the Loci of Parametric Variation

However, and for the view to be more comprehensive, one more factor should be added to account for the fact that there exist languages with same syntax say the verb moves only up to  $v^*$ , but still they vary in that the verb ( $V-v^*$ ) may or may not undergo interpretation with its complement/s.

This factor builds on the role of phase heads as the loci of parametric variations. More specifically, a phase head, mainly  $v^*$ , can come from the lexicon with specific instructions as to the p-phrasing of its domain<sup>40</sup>. I assume that the assumption of phase heads being the loci of parametric variations as well as that of the role of head movement (discussed earlier) are all we need to account for the fact that a phase head  $v^*$  can, in some languages, be included in its spell-out domain resulting in a p-phrasing type (VO) $\phi$ . These two assumptions will be discussed in the following sub-section in some detail and will be shown to be interleaving ones.

### 3.2.2.3 Two Interleaving Factors: A New Spell-out Mechanism<sup>41</sup>

As indicated before, the new thesis I assume in this work is that a phase head, mainly  $v^*$ , belongs to its spell-out domain. However, I also assume that although the phase head  $v^*$  belongs to its spell-out domain, it may or may not be spelled-out with its domain. Specifically, I assume that a phase head  $v^*$  can undergo interpretation along with its complement/s

- 1- in languages lexically parameterized to do so<sup>42</sup>
- 2- when it is syntactically possible: when the head needs no longer be available for head movement (i.e., it reaches its landing site)<sup>43</sup>

The two points mentioned above are not at odd with Chomsky's DbP, specifically speaking his PICs. The idea here is that the mapping via PIC should be assumed to be sensitive to the above-mentioned two points to allow more variability in the mapping of

<sup>40</sup> The domain of a phase head  $v^*$  includes this phase head, as it has been indicated before.

<sup>41</sup> This new spell-out mechanism will be discussed in greater detail in Chapter 4 of this dissertation.

<sup>42</sup> I assume here that languages are parameterized as to *the kind of spell-out* applying to their spell-out domains, itself a function of a strong phase head as the locus of parametric variation. The exact view is to be detailed in Chapter 4.

<sup>43</sup> This factor is a timing factor and I term it *the timing of spell-out relevant*.

domains. Doing so, the PICs will entertain a derivational status rather than their representational one. Moreover, the assumptions above conform to Chomsky's (2000, 2001) views: while the second assumption conforms to Chomsky's (2001) *simplest assumption* that phonology can spell-out elements undergoing no further movement, the first assumption is still in line with Chomsky's (2001) view that *parametric variation is restricted to the lexicon* and both assumptions may also find a motivation in a more generalized form of Chomsky's "generalization of the idea that operations can apply only if they have an effect on outcome"<sup>44</sup> (Chomsky, 2000, p. 109). That is, if a language is lexically parameterized to group a (phase) head with its domain as it is manifested by *the effect on outcome* (e.g., English exhibits the phrasing (VO) $\phi$ ), and this outcome is syntactically ensured as a (strong) phase head  $v^*$  has reached *its landing site* (e.g., V-to- $v^*$ ), then the inevitable assumption is that the head can undergo spell-out with its domain via PIC.

Hence, the view I develop here to account for the phrasing of a phase head  $v^*$  (V- $v^*$  or V- $v^*-T$ ) with its domain rests upon two interleaving assumptions: the first is that a phase head  $v^*$  can, in some languages, include an instruction to group the verb<sup>45</sup> with other elements in its domain and the second assumption is that a (phase) head  $v^*$  (V- $v^*$  or V- $v^*-T$ ) can undergo spell-out with its domain once it has reached its landing site. I assume that these two assumptions are all we need to account for the fact that the (phase) head  $v^*$  can, in some languages, be interpreted with its complement. To understand how these assumptions can work together, I will briefly account for the p-phrasing pattern (VO) $\phi$  in  $v^*$ -to-T languages. Accordingly, if the phase head  $v^*$  comes from the lexicon with the instruction that the verb and object in a particular language must be phrased together, and the verb is to syntactically move to T, then the only way to accomplish this instruction is to delay spell-out enough to allow head movement to take place so that the complex head (V- $v^*-T$ ) can finally be spelled-out in the lower slided phase  $v^*P$  in ways predicted by PIC2.

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<sup>44</sup> Here, the notion of effect on the outcome is employed as an evidence (and hence consequence) rather than a cause.

<sup>45</sup> V can end up in  $v^*$  or T.

One point to add is that the two factors defined above should be a part of any successful and integrated theory of the interface to allow different outputs to be accounted for. The broader readings of these two factors can be *what are the units that can be transferred to the interface?* and *when can the transfer operation happen?* respectively. These two factors find echo within phase-based theories as that of Richards (2007a) and Richards (2009)<sup>46</sup>.

### 3.2.2.4 Towards a Conclusion

Assuming all the analyses and discussions above, the fact that the cycle is single in syntax and phonology (i.e., syntactic domains define phonological ones)<sup>47</sup>, the fact that the verb universally moves to *v*, the fact that the internal structure of a derived head is syntactically indivisible, the fact that the verb can be phrased together with the object in many languages (a phrasing predicted by two<sup>48</sup> out of the three constraints the end-based uses to account for MaP-domains formation cross-linguistically) as well as some integrity condition as Richards' (2004) phase integrity condition stated below, we are lead to the fact that a phase head, mainly *v\**, can undergo interpretation with its complement in some languages. This proposal is extended to C if it exhibits a liability of phrasing with its complement.

- Phase Integrity Condition

For two adjacent categories to be parsed inside the same  $\phi$  (and any lower prosodic category), they must be spelt out in the same phase (Richards, 2004, p. 36).

Thus, and to conclude, the assumption pursued in this dissertation is that although a phase head belongs to its domain for spell-out purposes, it may/may not (at least phonologically) undergo interpretation with the domain it defines. To give it name, I call it the head parameter and I formulate it as follows:

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<sup>46</sup> See section 4.2 in the next chapter.

<sup>47</sup> Chomsky (2001) indicates that the phonological cycle is not an independent cycle but it “proceeds essentially in parallel” (Chomsky, 2001, p. 5).

<sup>48</sup> Both Wrap-XP and Align-XP,R predict that the verb be phrased with its complement in mono-transitive sentences.

- The head parameter

Languages are parameterized (at least phonologically) as to whether the head of a (strong) phase can undergo interpretation with its complement or not.

As to the issue whether the exact basis of this parameter is a phonological or a syntactic one, we have come across different possibilities:

- a. A general basis: It is regulated by functional categories specifically the phasal heads which come from the lexicon with specific (interface) properties (Gonzalez-Vilbazo & López, 2012). That is, phase heads can include specifications regarding p-phrasing. This assumption is more optimal as it places variability in the lexicon. This is the assumption I follow, and I believe that combining this assumption with my hypothesis that a (phase) head can undergo transfer with its domain the moment it is no longer needed for head movement, which can be somehow late, will suffice to account for the phrasing whereby a verb (V- $v^*$  or V- $v^*$ -T) and its complement/s are grouped together.
- b. A syntactic basis: It is dependent on syntactic movement. One instance is the object movement in some Bantu languages as Chichewa (Dobashi, 2004). However, the object movement in Dobashi's (2004) analysis is finally triggered by an OCC feature of  $v^*$ . I claim here that  $v^*$  in Chichewa includes the instruction that the verb and object should be phrased together and this instruction is both rescued and implemented by an OCC feature, which results in the object movement, and subsequently the verb (in T) and the object in Spec, $v^*$  can be spelled-out together in the domain of C, and hence phrased together<sup>49</sup>. Thus, account **b** may end up included in account **a**.
- c. A phonological basis: It is decided in phonology via the assumption that “different language-particular rankings of prosodic markedness constraints could give rise to different alternations to the prosodic structure produced by the universal prosodic spell-out principles” (Kratzer & Selkirk, 2007, p. 126).

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<sup>49</sup> Another account is that the XP movement is but a last resort strategy to accomplish the spell-out instruction of a phase head regarding how to map its domain onto a  $\phi$ . This is the account I assume and it will be argued for in some detail in Chapter 4.

Despite the fact that I cannot completely exclude the possibility that whether the phase head will be interpreted with its complement or not may vary from language to language due to some language-specific phonological constraints or parameters, this does not stop me from saying that the view where the *head parameter* is defined in relation to instructions in lexicon seems both more optimal and minimal(ist). This is because assuming it to be a consequence of phonology places a *vital role* on phonology in deciding p-phrasing, and hence weakening the role of the phase-based cyclicity in shaping phonological phrases. As I have indicated earlier in this chapter, the phrasing pattern (VO) $\phi$  in German with pitch accent on the object can be successfully predicted by both Kratzer and Selkirk (2007) as well as by Gonzalez-Vilbazo and López (2012). Thus, it seems that opting for the option where the head parameter is defined in relation to phasal syntactic elements (direct reference)<sup>50</sup> is perhaps the best strategy. However, opting for the option where the head parameter is defined in relation to phase heads, we are now left with two more complications:

- 1- The first is that the instructions included by the phase heads are intended only for the PF branch and hence interpretation by phonology. This still implies that it is syntax which decides (Major) phonological phrasing by including some special interface instructions, defined lexically, to be read and interpreted by the sensorimotor SM system. If this assumption is ever right, then it can partly<sup>51</sup> account for why the output of narrow syntax and semantics mirror each other but not that of syntax and phonology, a view indicated in some studies as Chomsky (2004). The reason thus and as we have seen may reside in the fact that the mapping to SM system is more complex than that to the C-I system.
- 2- The second is that the instructions included by the phase heads are necessary not only for structure interpretation by phonology but also for syntactic structure building and interpretation by C-I as well. This is the minimal(ist) hypothesis which simplifies the

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<sup>50</sup> One point worth mentioning here which is of some relevance is that it has been indicated that the fact that phonological domains are defined in relation to syntactic elements can find its support in a phenomenon as recursion. Recursion is generally assumed to be a feature of syntax and not phonology. However, the fact that the (major) phonological phrase, a constituent of the prosodic hierarchy, turns out to be a recursive one indicates its syntactic basis.

<sup>51</sup> It can only account partly for mismatches between phonological domains and syntactic structures because I assume that phonological considerations can also play a role in shaping phrasal domains in some languages.

mapping building on the assumption that syntactic and phonological effects of spell-out are similar due to the unification of the phonological and syntactic cycles.

The second view is the view I follow in this dissertation. One point to indicate here is that perhaps if we pertain a good command over both the syntax and interface facts of languages, the two complications mentioned above can finally get clarified.

In a nutshell, it has been argued here that a phase head, particularly  $v^*$ , belongs to its spell-out domain and can in some languages be spelled-out, and hence get phrased, together with its complement. Despite the fact that this assumption seems at the first glance to be a weakening of the phase theory<sup>52</sup>, it turns out that it is not and this is because it is still the phase head  $v^*$  which determines the variation in the p-phrasing of its domain (i.e., the verb ( $V-v^*$  or  $V-v^*-T$ ) and its complement/s).

### **3.2.3 A New Assumption to Live with**

The new assumption I will continue with in this dissertation and which will have a welcome result as far as the derivation of different phonological possibilities is concerned is that the spell-out domain of a (strong) phase head consists of both the (strong) phase head and its complement (contra Chomsky, 2000, 2001 and subsequent work). However, I also claim that whether the phase head undergoes spell-out along with its complement or not is parametrically dependent on the lexical feature the phase head may include.

This assumption is not a postulation or technology proposed to account for facts that would otherwise go unjustified, but it is one that emerges from the discussion in the previous sections. It has been shown in this chapter that a phase head, mainly  $v^*$ , can be spelled-out with its complement in some languages. Moreover, this assumption has one more welcome consequence. Accordingly, if one assumes that the fate (spell-out and hence phonological phrasing) of the phase head ( $V-v^*$  or  $V-v^*-T$ ) and its complement is decided within the  $v^*P$  phase, then the assumption that subjects<sup>53</sup> have different situation

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<sup>52</sup> This is because Chomsky's phase theory assumes that a phase head does not belong to its domain for spell-out purposes while this study assumes that a phase head does belong to its spell-out domain.

<sup>53</sup> Here, I assume that subjects are spelled-out by the main derivation workspace of the clause (Contra Uriagereka, 1999).

(in spell-out and phonological phrasing) from other elements falls naturally, as subjects tend in majority of cases to be phrased separately<sup>54</sup>.

Thus, the assumption here is that a phase head belongs to its spell-out domain<sup>55</sup>. To understand how this assumption will technically work, I will illustrate below its effects in relation to both PIC1 and PIC2 (Chomsky, 2001) and show that this assumption will be in no contradiction with PIC1 (Chomsky, 2001) in languages where the phase head and other element/s in its domain spell-out separately, though it apparently seems to be so. However, this assumption will appeal to a slight reconsideration of the spell-out domain defined by PIC1 & PIC2 (Chomsky, 2001) in the case where a phase head  $v^*$  ( $V-v^*$  or  $V-v^*-T$ ) undergoes spell-out along with other element/s in its domain.

i. PIC1: Considering PIC1, PIC1, as it will be assumed in this whole dissertation, is in effect in languages where  $v^*$  includes spell-out instructions of the following two types:

a. To spell-out the verb and object onto two separate domains<sup>56</sup>

Thus, and though the verb ( $V-v^*$  or  $V-v^*-T$ ) and object are assumed to belong to the spell-out domain of  $v^*$ , only the object will be spelled-out in the  $v^*P$  phase while the verb ( $V-v^*$  or  $V-v^*-T$ ) will remain accessible and will be spelled-out in the domain of C. Being so, the new assumption of the phase head belonging to its spell-out domain is in no contradiction with Chomsky's (2001) PIC1 since the phase head  $v^*$  (in the configurations  $V-v^*$  &  $V-v^*-T$ ) and object are spelled-out separately.

Actually, the case of languages with the phrasing type  $(S)\phi (V)\phi (O)\phi$  does not only conform to Chomsky's (2001) PIC1, but it also indirectly strengthens the assumption

<sup>54</sup> Within the end-based, subjects (but not subject pronoun) are always predicted to be phrased separately in SVO languages.

<sup>55</sup> However, this fact may get obscured by the spell-out instruction the phase head itself can bear namely if this instruction dictates that the verb ( $V-v^*$  or  $V-v^*-T$ ) be phrased separately from other element/s in its domain.

<sup>56</sup> Here, spell-out happens early disregarding head movement to  $v^*$  or T and this is due to the assumption that only the object/s must be spelled-out at this stage via the instruction of the phase head  $v^*$ . An example of this case of early spell-out can be French. French is a language with  $v^*$ -to-T movement and a phrasing of the type  $(V)\phi (O)\phi$ .

that a phase head  $v^*$  (in the configurations  $V-v^*$  &  $V- v^*-T$ ) belongs to its spell-out domain though it may not get spelled-out when spell-out applies to its domain. One actual illustration is French which is defined as a language with the p-phrasing ( $S\phi$  ( $V\phi$  ( $O\phi$ ). It is also defined as a  $v^*$ -to-T language and that the subject is in Spec, TP (Narita & Samuels, 2009). Thus, one can assume that the object is defined within the  $v^*P$  phase a separate domain. As for the verb (or  $V-v^*-T$ ), it will not undergo spell-out at this stage, and hence conforming to Chomsky's (2001) assumption that a phase head should remain accessible when its complement gets spelled-out. However, what is not clear here is that why should the subject<sup>57</sup>, landing in Spec TP, get spelled-out separately from the verb ( $V-v^*-T$ ) though all belong to the domain of C. Such a case finds a solution within the new proposal and the solution goes as follows. Within the  $v^*P$  phase,  $v^*$  as a phase head has the instruction to define its domain viz the verb ( $V-v^*-T$ ) and its complement as two separate domains<sup>58</sup>. The object will be early defined via PIC1 as a separate domain ( $O\phi$  within the  $v^*P$  phase. The other half of the instruction of  $v^*$  namely to define the verb as a separate domain will be carried over to the next strong phase level C. C in French seems to have no preferences (instructions) regarding the phonological phrasing of its domain and hence  $v^*$ 's instruction is carried over (spreading) to the C level resulting in only the verb being defined upon spell-out as a separate domain ( $V\phi$ ), while the subject will be defined as a separate domain when spell-out applies finally to the root.

Thus, and as it has been suggested by the French case above, the phase head  $v^*$  belongs to the domain of the phase it heads and this is suggested by the assumption that the fate of the verb ( $V-v^*-T$ ) is determined within the  $v^*P$  phase though it does not get spelled-out until the next level, conforming, in this case, to Chomsky's assumption that a phase head ( $v^*$ ) should remain accessible, more specifically to Chomsky's PIC1.

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<sup>57</sup> Here, I assume, in line with many existing studies, that the subject belongs to the main derivation workspace of the clause.

<sup>58</sup> The spell-out feature geometry of  $v^*$  as well as the notion of feature spreading will be defined towards the end of Chapter 4.

- b. To early spell-out the verb and object onto a single domain in languages where the verb does not move beyond  $v^*$

PIC1 is also assumed in this study to account for languages where a phase head (mainly  $v^*$ ) does undergo spell-out with its complement in languages with V-to- $v^*$  movement. However, for Chomsky's (2001) PIC1 to be the right candidate to handle this case, it should be used here with a slight modification in the definition of the spell-out domain so that the new definition includes the phase head itself in addition to its complement.

Turning to the exact details of this early spell-out form, I assume that the verb (V- $v^*$ ) and its complement can undergo spell-out within the  $v^*P$  phase via PIC1 which ensures the verb movement to  $v^*$ . More specifically, assuming a wrapping instruction of  $v^*$  manifested by the surface phonological phrasing (VO) $\phi$  plus the assumption of the universality of V-to- $v^*$  movement, spell-out on the  $v^*$  phase via PIC1 should include the phase head  $v^*$  with the result that only the edge (Spec,  $v^*P$ ) will be accessible. A good example to illustrate this case is English which has been previously discussed in this chapter.

## ii. PIC2: Late spell-out

PIC2 is assumed in this study to account for languages with  $v^*$ -to-T movement (resulting in what Gallego (2010) calls phase-sliding) and a p-phrasing whereby the verb (V- $v^*$ -T) undergoes spell-out with other elements in its domain due to the instruction of  $v^*$  to wrap its whole domain (head+ all other elements in its domain) onto a single domain. Thus, once again, and in line with PIC1, Chomsky's (2001) PIC2 will be used here with a modification in the spell-out-domain definition namely a spell-out domain consists of both the phase head  $v^*$  and its complement.

The delay via PIC2 is necessary to ensure that head movement has taken place or in Svenonius' (2001) terms that the head *has reached its final landing site*. Hence, once again, we can conclude that assuming a wrapping instruction manifested by the surface phonological phrasing (VO) $\phi$  plus the assumption of the role of syntactic

head movement of  $v^*$ -to-T in triggering a process of phase sliding, the spell-out domain of a phase  $v^*$  defined by PIC2 should include the phase head  $v^*$  (V- $v^*$ -T) with the result that only the edge (Spec, TP) will be accessible. A good example of this case can be Chichewa which has been discussed earlier in this chapter.

To conclude, incorporating the following notions into the PICs:

- 1- The domain of a strong phase head = head + other elements in its complement
- 2- The different possibilities in what can get spelled-out in the world languages: partial/full spell-out of the domain of a phase head
- 3- The role of head movement (mainly  $v^*$ -to-T movement) in delaying spell-out, the two PICs can perhaps be something near to the following:

#### *PIC1 (Two Phonological versions)*

- i. Some part/s of the domain of H is /are not accessible to operations outside HP; while H and its edge are accessible to such operations.  
[Given structure [ZP Z ... [HP α [H YP]]], with H and Z the heads of strong phases].
- ii. The whole domain of H (i.e., H+ all other elements in its complement) is not accessible to operations outside HP; only its edge is accessible to such operations.  
[Given structure [ZP Z ... [HP α [H YP]]], with H and Z the heads of strong phases].

#### *PIC2 (One Phonological version)*

The whole domain of H (i.e., H+ all other elements in its complement) is not accessible to operations at ZP; only its edge is accessible to such operations.

[Given structure [ZP Z ... [HP α [H YP]]], with H and Z the heads of strong phases].

### 3.3 Summary

The main thesis developed in this chapter is that a phase head mainly  $v^*$  belongs to its spell-out domain (contra Chomsky's DbP and subsequent work) and can undergo spell-out along with its complement in some languages. Moreover, this Chapter introduces the basic notions of the new spell-out mechanism, which will be developed in detail in Chapter 4, due to their relevance to the main issue discussed in this chapter namely whether a phase head can undergo spell-out with its domain or not?

## CHAPTER - 4

### The New Proposed Spell-out Mechanism at Large

#### **4.1 Preliminaries and Motivations**

Within the new theory of phases and MSO, the output-input relation between syntax and phonology takes the shape of cyclic spell-out where Chomsky (2001) suggests that the syntax-phonology mapping takes place at various points in the course of the derivation rather than all at once at the end of the derivation. Today, many spell-out-based theories of the syntax–phonology interface exist as that of Kratzer & Selkirk (2007), Dobashi (2004), Ishihara (2007) and Samuels (2009) among other, all aiming at providing evidence for the assumed cyclic domains within phonology.

Notwithstanding the flourishing of the phase theory, there seems to be no generalized spell-out-based approach of the phono-syntactic mapping, or to put it in more accurate words, there is a variability or non-uniformity as to what can be spelled-out and defined as a MaP domain. This chapter aims at putting the existing variability in MaP-domains formation within a more generalized spell-out-based design, incorporating existing cross-linguistic patterns. Specifically, I assume that the variability in what is spelled-out and defined as a MaP can be the function of a genuine spell-out mechanism. As a derivational mechanism, it is inevitably sensitive to language specific facts (i.e., movement, islandhood, and topicalization) and it is importantly assumed in this study to vary across two factors namely the timing of spell-out and the kind of spell-out applying. The final aim of establishing this mechanism is to create a more generalized framework which can be translated into a constraint-based framework like that of the end-based.

Specifically speaking, I assume here that some cross linguistic variations in p-phrasing can be accounted for as resulting from the spell-out mechanism, itself a function of phase heads. The assumption here builds on the role of phase heads in driving the derivation and shaping phonological domains and the analysis has the advantage that the inventory of strong phase heads does not vary from language to language. The main thesis is that phase heads can determine both what can be spelled-out and when to get spelled-out.

That is, the assumption here is that phase heads regulate the spell-out process by deciding both the kind of spell-out applying and the timing of spell-out as follows.

*1- Phase heads as the loci of parametric variations: The type of spell-out applying*

I assume here that the phase heads  $v^*$  and C are not only responsible for the derivation of the MaP level via MSO but they also determine variations in phonological phrasing at this level by lexically including specific instructions regarding the phonological phrasing of their domains. On minimalist grounds, this notion is a welcome one since “parametric variation is restricted to the lexicon” (Chomsky, 2001, p. 2).

If on the right track, this assumption can solve the problem discussed earlier in Chapters 1 and 2 namely whether the spell-out domain of a phase should be mapped directly (wholly) onto a MaP or not. Thus, the issue is reduced to a function of a phase head. As indicated above, the phasal heads  $v^*$  and C may include some specifications regarding the spell-out and hence phonological phrasing of their domains resulting in different though limited possibilities in phonological-domains formation. Phase heads  $v^*$  and C can accordingly determine how the element/s in their domains will be spelled-out: whether the whole (full) or parts (partial) of a spell-out domain should be defined onto phonological domain/s and I call this factor the *type of spell-out applying*. These possibilities in the formation of phonological domains are predicted by the end-based via the Wrap and Align constraints and whether Align is sensitive to the right or left edge of a syntactic structure.

i. Premise1:

Phase heads  $v^*$  and C can include genuine instructions regarding the spell-out (and hence the phonological phrasing) of their domains resulting in partial/full spell-out of their domains.

*2- Phase heads as spell-out triggers: The timing of spell-out relevant*

The assumption here is that phase heads can determine the timing of spell-out via their being *potential* points at which spell-out can happen. The simplest assumption is that *only phase heads* count as points of spell-out and it will be shown later in this chapter that this

assumption can partially tackle the issue of *what constitutes a spell-out domain in a language?*

That the strong phase heads can, as transfer/spell-out triggers, determine the timing of spell-out via either PIC1 or PIC2 (Chomsky, 2001), is a well-known fact. However, the new notion I want to develop is that the choice between PIC1 and PIC2 is finally made by phase heads, that is, whether PIC1 or PIC2 will be in effect in a language/case is something decided by phase heads by considering interacting aspects of phase heads. The exact details of this proposal will be discussed in the section dwelling on the timing of spell-out.

### ii. Premise2: A timing premise

Whether PIC1 (early spell-out) or PIC2 (late spell-out) is in effect in a language/case is something determined by phase heads  $v^*$  and C.

Accordingly, there can be two points of spell-out, early and late, defined in relation to Chomsky's PIC1 and PIC2 respectively. The assumption, hence, is that languages/cases can vary in that some languages/cases employ PIC1 while others make use of PIC2 resulting in early and late spell-out respectively.

The whole chapter will elaborate on the two premises defined above, and which I believe are all that we need to accommodate cross-linguistic variations in MaP formation. For the time being, let us wrap up this section.

- Spell-out is a mechanism regulated by two factors:
  - a. The type of spell-out applying (partial vs. full)
  - b. The timing of spell-out relevant (early vs. late)

## 4.2 Neither at Odd Nor Completely New

One point to indicate is that the two premises defined above should be a part of any successful and integrated theory of the interface to allow different outputs to be accounted for. As we have seen in the previous chapters the issues of the *what* and *when* to spell-out constitute a point of dispute among existing spell-out-based interface

theories. Moreover, these two factors find echo within phase-based theories as that of Richards (2007a) and Richards (2009)<sup>59</sup>. Richards argues that the phase theory defined in Chomsky (2000) in terms of lexical subarrays and the view of phases defined in Chomsky (2005, 2006) as the *locus of uF* have two distinct implications for the interface. Accordingly, Richards (2009) proposes that while Chomsky's (2000) lexical subarrays view of phases can be implemented to “define(s) the units that are actually transferred to the interfaces (the phasal domains)”, Chomsky's (2005, 2006) conception of phases is a timing one as it provides “the trigger for (and thus regulates the timing of) that transfer operation” (p. 13). One point to highlight here is that in the proposed LA-based approach in Richards (2007a), and as opposed to Chomsky's (2005, 2006), the notion *phase head* becomes *epiphenomenal* as he himself indicates and this is due to the fact that the role of C and v as spell-out triggers is finally reduced to their position in the LA, namely, their being the first heads in their LAs.

Although I do not buy the exact details of Richards' approach, the importance of his approach of the existence of two implications of the phase theory lies in stressing the assumption that the newly assumed two factors of the *kind of spell-out applying* and the *time of spell-out relevant* are neither at odd nor completely new notions. Specifically, I believe that a good interface approach is the one that can include these two implications though within a single framework, rather than assuming two versions of the phase theory, *each with a distinct contribution* as it is the case in Richards' approach. My proposal is a modest attempt in this direction, that is, to integrate these two implications within a single framework that pertains to nothing but phase heads. My analysis is a simple one building on basic assumptions within Chomsky's DbP and maintaining that phase heads and only phase heads determine both what can be spelled-out and when to spell-out. On the one hand, I assume that *the units that are actually transferred* are decided by phase heads as the *loci of parametric variations*, rather than being defined by Richards' lexical subarrays<sup>60</sup>, and this assumption allows more variability. On the other hand, I also assume that phase heads, being transfer triggers, decide *the timing of spell-out* via either

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<sup>59</sup> PROBING THE PAST: ON RECONCILING LONG-DISTANCE AGREEMENT WITH THE PIC.

<sup>60</sup> Actually, and unlike Chomsky (2000), the recent assumption within Chomsky is that input lexical items are selected directly from the lexicon without the intervention of a numeration.

PIC1 or PIC2, though I do not use the new framework of feature inheritance employed in Richards.

Although the notions of *what* and *when* to spell-out are defined within my proposal in a different way from that of Richards, both approaches highlight the importance of these two notions. However, and to the best of my knowledge, these two notions or implications have never been incorporated together within a single and simple spell-out-based framework as the one I try to develop here. The proposal I assume here incorporates the two main implications of these two conceptions of the phase theory within a new and simple framework that even allows more possibilities while still strengthening the role of phase head.

### **4.3 The Architecture of the Proposed Spell-out Mechanism**

The new spell-out mechanism to be developed here is based on two interacting factors namely *the timing of spell-out* and *the kind of spell-out* applying. The general assumption here is that once the notion of *the kind of spell-out* applying (partial vs. full spell-out) is combined with the notion of *the timing of spell-out* relevant (early vs. late spell-out), we will have the right tool to handle cross-linguistic variations in p-phrasing, excluding, of course, variations resulting from performance factors. Thus, this whole section will be intended towards the establishment of the proposed spell-out mechanism.

#### **4.3.1 The Type of Spell-out Applying: Partial vs. Full Spell-out**

##### *4.3.1.1 A New Proposal*

The main idea assumed here is that languages are parameterized as to how they determine the way syntactic information gets mapped into phonological structure. Focusing on the MaP level, and within the frame of the end-based, MaPs are generally defined in relation to syntactic maximal projections and, thus, cross-linguistic variations in p-phrasing is (parametrically) accounted for as per the instructions that languages set to map MaPs from syntactic phrases resulting in three constraints: 1- a MaP can be formed by referring to the right edge of a syntactic (lexical) maximal projection (Align-XP,R), 2- a MaP can be formed by referring to the left edge of a syntactic (lexical) maximal projection (Align-

XP,L ) or 3- a MaP can be formed by wrapping a syntactic (lexical) maximal projection (Wrap-XP).

Extending the same analysis above to the new spell-out-based interface account, one can claim that though MaPs are generally defined in relation to the spell-out domains of phase heads, cross-linguistic variations in p-phrasing can also be accounted for by some parameters defined by languages to map these spell-out domains onto MaPs. Notwithstanding the success of the align constraints, originally the end parameter (Hale & Selkirk, 1987), and the wrap constraint, originally the government parameter (Hale & Selkirk, 1987), in explaining many of the existing variations in MaPs formation, neither the parametric account nor the constrained-based one can be maintained in their end-based forms within the new interface phase theory and this is due to, at least, two reasons:1- they are defined in relation to the X-Bar module of GB and 2- they assume notions as directionality in syntax<sup>61</sup>. Within a derivational-based theory as the phase theory, the parameters of directionality and government within the theory of Hale and Selkirk (1987) should be better seen as the functions of a functional category preferably of a phase head.

Hence, the new proposal assumed here falls under the general assumption that cross-linguistic variation is based on certain features of functional categories, that is, languages vary with respect to the functional categories they instantiate. Specifically speaking,  $v^*$  and C, as universal functional categories and phase heads, are assumed here to be the core of parametric variations. Such an assumption takes a *radical* form within Richards (2004).

- Parameter Setting Assumption

Parametrical variation is restricted to phase heads (C and  $v^*$ ) (p.108).

The view I pursue here is that both  $v^*$  and C can be lexically specified with genuine instructions regarding the p-phrasing of their domains in line with the findings of the study conducted by González-Vilbazo and López (2012). However, within the new proposal here, the instructions assumed to be contained by phase heads have a

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<sup>61</sup> For more details on the shortcomings of the end-based theory, see Chapter 2 of this dissertation.

derivational wear as they determine the kind of spell-out applying to a spell-out domain namely partial vs. full spell-out. One point to indicate is that the notion of partial and full spell-out of a spell-out domain can be defined in relation to both  $v^*$  and C as phase heads. One advantage here is that the *wholes versus parts* assumed feature of phonology has now a new justification namely phase heads can have specific instructions regarding how much of structure phonology can see at a time.

In the following I will try to develop the new notion of partial and full spell-out within a featural framework. This featural framework will be finally translated into a new constraint-based system in Chapter 5, which has the advantage of having a simple grammar like that of the end-based theory while still enjoying some derivational flavor by reflecting the actual way mapping (i.e., spell-out) is assumed to occur.

My proposal is formulated as follows:

1. Phase heads  $v^*$  and C can include genuine instructions regarding the interpretation of their domains<sup>62</sup> (or to be more specific, regarding the way their domains are mapped onto phonological domains, i.e., MaPs)
2. Assuming a right-branching structure, I propose that  $v^*$  can include spell-out instructions of two types:
  - a. Full spell-out:  $v^*$ , accordingly, can include instruction to spell-out and define its whole domain onto a single MaP or  $\phi$ . This type of instruction results in grouping the verb (in  $v^*$  or T) with its complement/s onto a single  $\phi$ , a phrasing predicted by Wrap-XP within the end-based. This instruction is the right tool to handle the p-phrasing type (VOO) $\phi$  observed in languages as Chichewa (Truckenbrodt, 1995).
  - b. Partial spell-out:  $v^*$  here can include one of the following two kinds of instructions:
    - I. Partial spell-out (maximum):  $v^*$  can include instruction to define its domain onto two separate domains or  $\phi$ s: one including the verb and its first complement, and another including the second complement,

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<sup>62</sup> As it is indicated in Chapter 3, the domain of a phase head is assumed in this work to include both the phase head plus its complement.

resulting in a phrasing similar to that predicted by Align-XP, R. Thus, the second complement will be spelled-out in the domain of  $v^*$ . As for the verb (in  $v^*$  or T) and its first complement, the instruction of  $v^*$  to spell-out the verb and its first complement onto a separate domain can be carried over to the next strong phase level C, resulting in the verb and its first complement being spelled-out together in the domain of C. Subject, on the other hand, can be spelled-out when spell-out applies to the root<sup>63</sup>. Such kind of analysis can be extended to SVOO languages with the p-phrasing (S) $\phi$  (VO) $\phi$  (O) $\phi$  as Chi Mwi:ni (Truckenbrodt, 1995).

- II. Partial spell-out (minimum):  $v^*$  can, in other cases, include instruction to spell-out the verb and its complement separately, a p-phrasing predicted by Align-XP, L. Considering an SVO language as French with the phrasing type (V) $\phi$  (O) $\phi$ , the derivation can go as follows. The object will be spelled-out in the domain of  $v^*$ . The verb (in T), will be spelled-out separately in the domain of C via the spreading of  $v^*$ 's instruction to C. Subject, on the other hand, will be spelled-out when spell-out finally applies to the root

In line with  $v^*$ , I assume that C can also include full-spell-out instruction to wrap its domain<sup>64,65</sup>:

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<sup>63</sup> Other possibilities that can be assumed to account for the separate phrasing of subjects in different languages are :

- a. The subject is in A' position (in some languages): Ishihara (2007) and Narita and Samuels (2009).
- b. The subject is an island: Uriagereka (1999). There are, however, counter examples to this assumption.
- c. The subject condition: I assume here a highly ranked constraint entailing that Subjects should be phrased separately in many languages. This constraint has its supremacy in almost all interface theories. Within the end-based, the relation-based and even within most phase-based versions, the prediction is that the subject is phrased separately.

<sup>64</sup> While all the instructions of  $v^*$  discussed above have equivalent constraints within the end-based theory, the full-spell-out instruction of C has not. The full-spell-out instruction of C is a new assumption I propose and establish in the part entitled *Establishing and proposing full-spell-out instruction (feature) of C*.

<sup>65</sup> However, there is also the case where C may not include any instructions regarding the spell-out of its domain. The details of this assumption are discussed towards the end of this chapter in the section handling the feature geometry of C.

- a. Full spell-out: C can include instruction to wrap its whole domain TP<sup>66</sup> onto a single  $\phi$  resulting in the phrasing (SVOO) $\phi$ . The prediction here is that such a phrasing occurs in languages where spell-out on the  $v^*P$  phase is delayed via PIC2 until the merger of C, C's full-spell-out instruction then takes effect resulting in the wrapping of its domain, hindering spell-out on the previous phase ( $v^*P$ )<sup>67</sup> and this may account for the fact that in some languages there seems to be no evidence of spell-out on the  $v^*P$  phase which leads many linguists to conclude that only CP is a phase in these languages. My proposal, however, has the advantage of keeping the phase inventory intact and providing a plausible account namely spell-out on the  $v^*P$  phase may be obscured by instructions of a higher phase head. Such kind of account can be extended to Xhosa, a language with V-to-T movement and a phrasing type (SVOO)  $\phi$  (Zerbian, 2004)<sup>68</sup>.

To summarize, I assume that languages vary with respect to the kind of spell-out features the phase heads  $v^*$  and C may include. I thus assume that the partial or full p-phrasing of the domain of a phase head is a function of the phase head in question, and that conditions as the highest phrase condition (Kratzer & Selkirk, 2007) and the condition defined within Dobashi (2004) which entails the spelling-out of everything except the initial element, in addition to the Wrap and Align, are all different translations or manifestations of the features that phase heads may instantiate.

#### 4.3.1.1.1 Establishing and Proposing Full-Spell-out Instruction (Feature) of C.

##### 4.3.1.1.1.1 An Intonational Phrase (IP) or a Major Phonological Phrase (MaP)

It is generally assumed that CP (mainly a root clause) is equated with the intonational phrase (IP), a notion that goes back to the end-based theory where the edge of an intonational phrase is demarcated by the edge of a clause (CP or sometimes IP). Within

<sup>66</sup> Or what remains of its domain, if some element(s) has(have) already been spelled-out within the previous phase.

<sup>67</sup> The exact details of this process will be discussed towards the end of this chapter in the part dwelling on the feature Geometry of C.

<sup>68</sup> However, if the lower complement has already been spelled-out in the domain of  $v^*$  via PIC1, then the full-spell-out instruction of C will result in the verb, its higher complement and subject being spelled-out together in the domain of C. We will see in Chapter 6 that this is the observed p-phrasing pattern in San'ani Yemeni Arabic as San'ani exhibits the phrasing pattern (SVO) $\phi(O)\phi$ .

the new theory of phases, this notion is re-emphasized. For example, a CP is mapped to an intonational phrase in English as it is indicated by Shiobara (2009)<sup>69</sup>. However, there exist some cases which posit a challenge to this view as there exist languages where a large domain of the clause size (SVO) is still defined as a MaP domain. I thus believe that while domains of small or intermediate size (e.g., (V) or (VOO) domains) can consistently be maintained as domains of the MaP, domains as large as a clause (i.e., (SVO) domain) can be either the domains of the MaP or the IP depending on languages' specific facts. The assumption that CPs can spell-out their entire domain onto MaPs gets support from at least two observations: one is the existence of languages with the phrasing (SVO)φ, and the second is the assumption that some languages exhibit no evidence for the IP level indicating that the IP level does not exist in these languages (contra the assumption of the universality of the constituents of the prosodic hierarchy). In the following, I will discuss these two observations in some detail.

A- Existence of languages with the phrasing (SVO)φ, (SVOO)φ: Zerbian (2004) on Xhosa  
One relevant study here is Zerbian (2004) on Xhosa. Using both vowel lengthening and word-final high tone deletion as diagnostic cues for the MaP boundaries in Xhosa, Zerbian (2004) defines the large domains (SVO) and (SVOO) as the domains for the MaP level. To illustrate, consider the following two examples from Zerbian (2004) after Jokweni (1995).

#### Example (1)

a-(abántwana ba-kháb' íbhóóla)φ

children SC-kick ball

'Children are kicking the ball.' (p. 97)

b-(ba-ník' úmam' úkuutyá)φ

SC-give mother food

'They give the mother food.' (p. 86)

B-Non-existence of the IP level in some languages: Hellmuth (2011) on Egyptian Arabic (EA)

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<sup>69</sup> "A CP is mapped to an IntP in English" (Shiobara, 2009, p. 197).

Hellmuth (2011) importantly indicates the possibility of the non-existence of the IP level in EA and to quote Hellmuth's own words, "Although some languages show distinct cues to phrasing at different levels of the prosodic hierarchy, this is not the case in EA... spell-out of a single level of phrasing may be sufficient for analysis of the phrasing facts of EA. This would yield a 'prosodic hierarchy' composed only of PWds (mapped from morphosyntactic words) and MaPs (mapped from spell-out domains). In turn, phenomena such as boundary tone combinations may in EA prove to be better analyzed as markers of turns (mapped from discourse structure) than of a distinct IP level domain." (Hellmuth, 2011, p. 265)<sup>70</sup>.

One point of interest to mention here is that Arabic and Xhosa (Seidl, 2001) are all languages with V-to-T movement. It will be shown later in this chapter that V-to-T movement can result in a delay in spell-out in ways predicted by PIC2. This delay is vital to account for the existence of domains as large as the clause especially if this delay is accompanied by the assumption that C has wrapping instruction. This latter assumption is the main motivation for presenting this section in the first place since the following section will build on this assumption. More specifically, the following section will assume that C with wrapping effect can in some languages spell-out MaPs and this assumption will, if I am correct, result in an extension on Hale and Selkirk (1987) and Truckenbrodt (1995).

#### 4.3.1.1.2 An Extension on Hale and Selkirk (1987) and Truckenbrodt (1995, 1999)

The main intention of this section is to extend the role of the constraint Wrap assumed within Truckenbrodt (1995) and to show that this extension falls as a natural result once we assume the new theory of phase and MSO.

In his reanalysis of Hale and Selkirk's (1987) account of p-phrasing in Papago, which is dependent on the parameter presented below, Truckenbrodt (1995) demonstrates that the

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<sup>70</sup> Worth mentioning is that Hellmuth (2004), employing both phonological and phonetic cues to phrasing, shows that the majority of SVO sentences in EA are produced as a single MaP yielding the phrasing (SVO)∅ and this phrasing is assumed to result from the higher ranking of a phonological minimality constraint over the syntax-phonology mapping constraint Align-XP,R.

p-phrasing in Papago can better be accounted for by assuming the Wrap-XP constraint<sup>71</sup> and confining its application to lexical maximal projections and thus excluding the possibility that Wrap can apply to IP as a functional maximal projection.

- Papago phrasing government parameter<sup>72</sup> (Hale & Selkirk, 1987)  
The right edge of a maximal projection XP which is not lexically governed corresponds to the right edge of a tonal group (a major phonological phrase).
- Wrap-XP: Each lexically headed XP must be contained inside a  $\phi$  (Truckenbrodt, 1995, p. 81).

However, the analysis within Hale and Selkirk (1987) does not seem to exclude the possibility that functional maximal projections mainly IP can as well trigger a MaP boundary, though this is not the case in Papago<sup>73</sup>. Specifically speaking, while attempting an alternative account to the end-based one, Hale and Selkirk discuss a constituent matching theory<sup>74</sup> where they discuss the possibility of VP or IP, as non-lexically governed maximal projections, being mapped onto MaPs. Despite the fact that they conclude that IP does not seem to be relevant in the case of Papago, the indirect assumption is that it may be relevant in other languages. Thus, we can conclude that IP as a functional category is not excluded from corresponding to a MaP and this assumption is vital for accounting for phrasing patterns found in languages like Xhosa<sup>75</sup>, particularly if

<sup>71</sup> Truckenbrodt (1995) also uses the constraint Align-XP,R, following the assumption of Hale and Selkirk (1987) that right edges rather than left ones matter in Papago. According to Truckenbrodt (1995), phonological phrasing in Papago can be accounted for via the constraints system: Wrap-XP>> Align-XP,R.

<sup>72</sup> The general format of the government parameter can be as the following:

- Hale and Selkirk (1987): phrasing is sensitive to lexical government  
Align the {left/right} edge of each syntactic category SCat with a prosodic category PCat, where a language may choose
    - a. SCat = XP, or
    - b. SCat = XP so long as it is not lexically governed,  
(other options for SCat omitted here)
 and PCat = p-phrase  
(other options for PCat omitted here)
- (taken from Truckenbrodt, 1999, p. 234)

<sup>73</sup> Though this is not the case in Papago as only lexical maximal projections NP and VP coincide with the edge of a MaP.

<sup>74</sup> Accordingly, the designated constituent itself, that is not lexically governed, can correspond to a phonological phrase.

<sup>75</sup> Xhosa is a language with the phrasing (SVOO) $\phi$  following Zerbian (2004)

we assume for Xhosa a syntax as that assumed within Seidl (2001) for symmetrical Bantu languages.

Maximizing the effect of the government parameter, we can thus assume the following: languages are not only parameterized as to whether lexical government is relevant or not, they are also parameterized as to whether this parameter applies to lexical or functional maximal projections. This has the effect of creating a more powerful theory that can incorporate more of the existing phonological possibilities.

Within the framework of Truckenbrodt (1995), my extension can be read as the following: just as Wrap-XP is defined in relation to VP as a lexical<sup>76</sup> maximal projection, another form of Wrap call it Wrap-XP' is defined in relation to IP as a functional maximal projection<sup>77</sup>. To elaborate, Truckenbrodt assumes the constraint Wrap-XP and uses it only in relation to lexical VP to account for languages as Chichewa and Papago where the verb and two objects group onto a single  $\phi$  while the subject is phrased separately. However, his analysis cannot account for the phrasing pattern found in languages as Xhosa where the subject, verb and two objects are wrapped onto a single MaP<sup>78</sup>. In the same way that Truckenbrodt seems to tie the application of Wrap-XP to VP, I go on and assume that Wrap-XP' can apply to a functional maximal projection, and this application of Wrap is now tied to IP only. This extension will allow us to account

<sup>76</sup> If Wrap-XP applies only to lexical maximal projections, then it is not clear how Wrap-XP would apply to VP and wrap the verb with other elements onto a single  $\phi$  in Chichewa or Papago especially if we consider the current assumption of the verb movement to  $v^*$ (or beyond). Thus, and if one still insists on the notion that Wrap-XP applies only to lexical projection, one can end up assuming that Wrap-XP applies to  $v^*P$  (by considering it as a lexical projection following some linguists as Baker(1999), see Chapter 6 of Seidl (2001) for elaboration on Baker's proposal) rather than to lexical VP. Doing so, we are but strengthening the new assumption in this dissertation that spell-out applies to the domain  $v^*P$  ( $v^*$ + its complement) rather than to the complement of  $v^*$  as it is standardly assumed (Chomsky, 2000, 2001). Moreover, if one adopts the new theory of phases (where notions of maximal projections and lexical categories are dispensable ones) plus the new proposed assumption that a phase head  $v^*$  does belong to the domain of the phase it heads for spell-out purposes, then the desired effect of Wrap-XP can be both simply and derivationally attained.

<sup>77</sup> One point to stress here is that I am not going to make use of the constraints Wrap-XP or Wrap-XP' in this dissertation since they are constraints built on the notions of maximal projections and the distinction between functional and lexical projections. I am just using them here to make the extension I intend to explain clearer. Instead, Wrap-XP is seen in this work as full-spell-out instruction of  $v^*$ , whereas Wrap-XP' is seen as full-spell-out instruction of C. The exact format of the two full spell-out constraints that are to replace Wrap-XP and Wrap-XP' will be defined in Chapter 5.

<sup>78</sup> His analysis can account for languages with the p-phrasing (SVOO) $\phi$  only by assuming that the subject and objects belong to the VP and that Wrap-XP apply to VP.

for languages as Haya, Kinyambo, Northern Sotho (Zerbian, 2007), and the southern Bantu language of Xhosa (Zerbian, 2004) which exhibit a p-phrasing wherein the subject, verb and two objects are mapped together onto a single MaP.

This extension is not an odd one at all. It is rather the consequence of assuming the phase theory of Chomsky (2001) and subsequent work. The two elements defined above to be subject to Wrap are presented below and a closer look at these two categories reveals the identity of these two categories: VP and IP are the complements of the phase heads  $v^*$  and C respectively.

- Elements liable to wrapping effects:

- 1- Lexical VP (Truckenbrodt, 1995)<sup>79</sup>
- 2- IP/TP (my proposal)

The effects of my Wrap-XP' as well as that of Wrap-XP (Truckenbrodt, 1995) have already been integrated into the new proposal of the *type of spell-out applying* defined above. Accordingly, the effects attained by Wrap-XP and Wrap-XP' have been defined as full spell-out instructions of  $v^*$  and C respectively. Thus, the assumption here is that strong phase heads in some languages can include instructions to *wrap* their whole domains onto single MaPs and this is what I refer to as *full spell-out*.

How the new extension is derivationally implemented is a simple issue that builds on the role of phase heads though this time as transfer hinders, rather than transfer initiators. I, accordingly, claim that a phase head C with strong wrapping spell-out instruction can, in the case where PIC2 is the relevant, result in hindering, rather than initiating, spell-out on a lower  $v^*$  phase with the consequence that we have only one instance of spell-out

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<sup>79</sup> Truckenbrodt's (1995) Wrap-XP does not seem to assume the universal verb movement to  $v^*$ . However, in the new analysis I develop in this dissertation, I do assume it. Accordingly, I assume that the phase head  $v^*$  can bear instructions (features) regarding what can get spelled-out, and that the spell-out domain includes the phase head as well and this assumption is strengthened by the fact that both phase heads  $v^*$  and C get spelled-out along with their complements in some languages. Thus, the elements liable to wrapping are better defined as the following:

- Elements liable to Wrapping effects:
- 1- The domain of  $v^*$  (i.e.,  $v^*P$  minus its Spec)
  - 2- The domain of C (i.e., CP minus its Spec, or IP )

applying to the domain of C. This account can be extended to languages as Xhosa, which exhibits the single domain pattern viz (SVOO)φ.

- *The process of late spell-out via PIC2 with no spell-out on a lower (slided) phase*

- a. Cyclic transfer waits (under PIC2)
- b. C is merged hindering, rather than initiating, spell-out on the lower (slided) phase as it comes from the lexicon with instruction to wrap its whole domain onto a single MaP → spell-out on the lower phase is ignored by this higher instruction.
- c. Spell-out on the CP phase can also be regulated by PIC2 and thus it will be delayed till the merger of another strong phase head.
- d. If there is no other strong phase head higher than C, then spell-out occurs by the completion of CP (or may be spell-out occurs in the root) and C triggers cyclic transfer of its whole domain (i.e., IP/TP (or C +IP/TP) onto a single φ.

Before moving on any further, I want to draw below a comparison between Chichewa, an asymmetrical Bantu language with the p-phrasing (S)φ (VOO)φ which is accounted for by Wrap-XP (i.e., Wrap-VP), and Xhosa, a symmetrical Bantu language with the p-phrasing (SVOO)φ and which I assume to be accounted for by the newly proposed Wrap-XP' (i.e., Wrap-IP). I assume that the difference between the two Bantu languages<sup>80</sup> finds a better account within the new theory of derivation by phase and my new spell-out mechanism.

#### 4.3.1.1.2.1 Chichewa and Xhosa: A Comparison

Befor going on to discuss my new account of Chichewa and Xhosa, I would like to go through some previous accounts of the differences between these two languages.

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<sup>80</sup> Zerbian (2007) actually divides Bantu languages into three types:

- a. Languages with the (S)(VO)(O) phrasing pattern: Languages that phrase major syntactic constituents, namely the subject and the second object, separately, while the verb is phrased together with the first object yielding the phrasing (S)(VO)(O) as it is the case in Chi Mwi:ni, Tsonga and Kimatumbi .
- b. Languages with the (SVOO) phrasing pattern: Languages that phrase the subject, verb and two objects onto one p-phrase resulting in the phrasing (SVOO) and such phrasing exists in languages as Haya, Kinyambo, Xhosa and North Sotho.
- c. Languages with the (S)(VOO) phrasing pattern: Finally we have a mixed-type category exemplified by Chichewa.

## A. Two Previous Accounts

### I- Seidl (2001): A Theta-Domain-Based Account

Within the framework of Seidl (2001), Chichewa is classified as an asymmetrical Bantu language while Xhosa is defined as a symmetrical Bantu language. Basically, Seidl proposes that the difference in phonological domain structure between asymmetric and symmetric languages is dependent on the difference in the syntactic structure between these two categories. Employing the syntactic brackets of theta domains, Seidl accounts for the single domain pattern (i.e.,(V NP NP)) and the split domain pattern (i.e., (V NP)(NP)) in double object constructions found in symmetric and asymmetric languages respectively.

Using the two rules defined below, Seidl (2001) accounts for the difference in phonological phrasing found between symmetric and asymmetric Bantu languages<sup>81</sup>.

#### a. Edge rules

- i. Either Left or Right edges of theta-domains project a corresponding boundary onto the prosodic plane.

<sup>81</sup> Using the rules mentioned above, the difference in p-phrasing between symmetric and asymmetric can be explained as follows:

#### 1- Symmetric:

In symmetric languages as Xhosa, all arguments are not in their base positions at spell-out and thus nothing remains in the theta-domain. Specifically,

- i. The DO moves out of its theta-domain (VP) to the specifier of ApP in symmetric languages.
- ii. Only, the edge marking rule (LLL) applies and thus the sentence will be mapped onto one phonological domain resulting in the single domain pattern (SV IO DO)φ.

This kind of effect amounts within my proposal to the effect of Late /Full spell-out on the CP phase. However, it will be shown below while discussing Samuels (2009) that the single domain cannot be easily predicted on a spell-out-based account and this is probably why Seidl (2001) defines the mapping in relation to theta-domains rather than phase domains.

#### 2- Asymmetric:

- i. DO in asymmetric languages remains in VP where it receives its theta-role and phonology then projects a left bracket at the left edge of the theta-domain
- ii. Then, the Edge rule inserts a left bracket at the beginning of the sentence resulting in the split domain pattern (V IO)φ (DO)φ.

An important point to highlight here is that despite the fact that Chichewa, as an asymmetric language, is predicted to have the phrasing (V NP)φ(NP)φ, Chichewa exhibits the phrasing (V NP NP)φ. To account for this phrasing, Seidl indicates that the difference between Chichewa and other related asymmetric languages lies in the way theta-domain projects. Accordingly, theta-domains project a right bracket in Chichewa while other asymmetric Bantu languages as Chi Mwi:ni project a left bracket.

- ii. An edge marking rule (LLL) inserts a boundary at the beginning of a sentence (p. 76).

b. In situ rule for theta-domains

A theta- domain will project a bracket iff it contains the constituent theta-marked by the head of that theta-domain. This is crucial for both overt and covert constituents, i.e., traces “count” (p. 76).

In a word, within Seidl (2001), and apart from the syntactic differences between symmetrical and asymmetrical languages, the difference in mapping between Chichewa and Xhosa can be summarized as follows:

- ✓ Chichewa: Theta-domains project a right bracket. This kind of effect amounts within my proposal to the effect of full spell-out applying to  $v^*$ 's domain resulting in a wrapping effect similar to that of Truckenbrodt's (1995) Wrap-XP.

$[[ V [ IO [DO]_{VP} ]_{ApIP} ]_{vP}]_{TP}$	syntax
V IO DO)	theta-domains project right
(V IO DO)	Edge: LLL (Seidl, 2001, p. 103)

- ✓ Xhosa: Only the edge marking rule (LLL) applies and thus the sentence will be mapped onto one phonological domain resulting in the single domain pattern (SV IO DO). This kind of effect amounts within my proposal to the effect of full spell-out applying to the domain of C (i.e., Wrap-XP') resulting in wrapping effect that ignores the spell-out on the lower phase  $v^*P$ .

SM-T- $v$ -V-appl IO DO	after syntax
(SM-T- $v$ -V-appl IO DO	phonology (Seidl, 2001, p. 95)

As it is shown above, employing a theta-domain-based account, Seidl (2001) succeeds in accounting for the difference in phonological phrasing between symmetric and asymmetric languages. However, a good story will be the one that can account for the single and split domain patterns found in symmetric and

asymmetric languages respectively by employing the current spell-out-based theory.

## II- Samuels (2009): A Spell-out-Based Account

Following McGinnis (2001), Samuels (2009) indicates that the p-phrasing facts in symmetric languages vs. asymmetric ones are better defined in relation to spell-out domains rather than theta-domains as it is the case with Seidl (2001). The relevant aspect of her discussion to the topic at hand is her indication that the phrasing pattern (S V IO DO), assumed by Seidl for symmetric languages as Xhosa, cannot be attained if we assume a spell-out account. More specifically, Samuels indicates that the only predicted phrasing for symmetric languages is (S V)(IO DO) and in Samuels' own words “For symmetric languages, though, neither leaving the subject and verb in vP or raising them predicts the single (SV IO DO) domain which Seidl claims is necessary. Whether or not the subject and verb remain in vP, we still get (SV)(IO DO)” (Samuels, 2009, p. 305). As regards Chichewa, there is nothing specific to tell about it. Samuels only derives the basic phrasing of asymmetric language (of which Chichewa is one) and according to which the verb and IO will be spelled-out together while the DO will be spelled-out separately resulting in the phrasing (V IO) (DO). However, Chichewa, though an asymmetric language, does not exhibit this phrasing pattern as it has the phrasing (VOO) and Samuels (2009) does not handle this peculiarity.

## B. My New Account

The analysis I develop here is a spell-out-based one. Accordingly, and as far as the spell-out mechanism proposed in this work is concerned, the difference between Chichewa (asymmetric Bantu language) and Xhosa (symmetric Bantu language) can be studied in relation to the following two factors.

### I. The type of spell-out applying

- a. Chichewa: I assume that it is the phase head  $v^*$  that includes the full-spell-out (wrapping) instruction of its domain onto a single  $\phi$ . Accordingly, spell-out on the lower phase is accomplished and the instruction of the phase head  $v^*$  takes effect resulting in the verb and two objects being wrapped onto a single  $\phi$

within the domain of the lower (slided) phase. As for the subject, it gets spelled-out later in the domain of the higher phase head C.

- b. Xhosa: It is the phase head C that includes the full-spell-out (wrapping) instruction of its domain onto a single  $\phi^{82}$ . For this instruction to have effect, the timing of spell-out is important. As it will be shown below, spell-out in Xhosa is regulated by PIC2 which delays spell-out till the C level. This delay of spell-out accompanied by the wrapping instruction of C result in only one instance of spell-out applying to the domain of C<sup>83</sup>. In Chapter 5 on OT, I will show how the Xhosa data presented in Zerbian (2004) will find a better new OT account than that presented in Zerbian (2004), once we employ the notion that C in Xhosa includes wrapping instruction and recast it as an OT constraint.

## II. The timing of spell-out relevant<sup>84</sup>

- a. Chichewa: Late spell-out

Within Dobashi (2004), Chichewa is assumed to be a  $v^*$ -to- T language<sup>85</sup>. Here, we can assume that spell-out applies via PIC2 and thus spell-out on the lower (slided) phase is accomplished and the full-spell-out instruction of the phase head ( $v^*$ ) takes effect resulting in the verb and its two complements being spelled-out together by C merger onto a single  $\phi$  viz (VOO)  $\phi$ .

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<sup>82</sup> It will be shown in Chapter 5 that  $v^*$  in Xhosa has also wrapping instruction just as Chichewa. However, while  $v$ 's wrapping instruction in Chichewa is performed,  $v$ 's wrapping instruction in Xhosa does not see the light as it gets overridden by the strong wrapping instruction of C. Thus, perhaps the real difference between Chichewa and Xhosa is that C in Xhosa has strong wrapping instruction while C in Chichewa does not have this instruction.

<sup>83</sup> To understand the exact details of the process of spell-out in Xhosa, see the part dwelling on *The process of late spell-out via PIC2 with no spell-out on a lower (slided) phase*, discussed within the previous section 4.3.1.1.2.

<sup>84</sup> The factor of the timing of spell-out relevant has already been discussed in some detail in the previous chapter. However, this factor will be both established and argued for in greater detail in this chapter.

<sup>85</sup> However, within the framework of Seidl (2001), Chichewa is defined as an asymmetric Bantu language the main characteristic of which is that the verb moves only to an Aspect head (not to T as it is the case with symmetric languages).

b. Xhosa: Late spell-out

Within the framework of Seidl (2001), Xhosa is described as a  $v^*$ -to-T language. As a  $v^*$ -to-T language, Xhosa is categorized within my proposal<sup>86</sup> as a language with late spell-out regulated via PIC2. Hence, spell-out on the  $v^*P$  phase is delayed till the C level, and since C in Xhosa includes full spell-out instruction, spell-out on the lower phase is not accomplished resulting in a large domain that includes the subject, verb and two objects (i.e., (SVOO) $\phi$ ).

To conclude, the phase theory is to gain a strong ground if it is to integrate the insights of its antecedent interface theories though in ways that optimize the role of the phase notion and cyclicity. Within the new phase approach I propose here, directionality, government role in phrasing as well as the lexical/functional distinction are all eliminated and their effects are rather assumed to result from the way derivations proceed and the way phase heads can regulate the spell-out of their domains.

#### 4.3.1.2 Spell-out Features

The main aim of this section is to strengthen the notion that certain features can include specific instructions (to the S-M system) regarding spell-out, a notion upon which the proposed spell-out mechanism is based. Within the framework of Adger and Svenonius (2010), such features are categorized as *interface features* or to be more accurate *syntax-phonology interface features*. However, I choose to employ a more specific term to categorize the type of features that regulate the spell-out process, by deciding what portions to spell-out<sup>87</sup> and where a word (mainly a head)<sup>88</sup> is to be spelled-out, and I call them *spell-out features*.

Hence, this section will sketch main studies assuming, arguing for or building on the notion of the existence of spell-out features (with different though limited instructions regulating the spell-out process). In the following, I survey some of the syntax-phonology

<sup>86</sup> See the part dwelling on the timing of spell-out.

<sup>87</sup> This is what I call the type of spell-out applying to a spell-out domain and it can be partial or full.

<sup>88</sup> Here, I mainly have in mind the assumption of the existence of features as Brody's \* (see Adger & Svenonius, 2010) to be discussed in this section. However, I will not employ Brody's \* in my analysis as I assume head movement and its role in re-defining syntactic domains (following Gallego, 2010).

interface features<sup>89</sup> assumed in literature, concentrating on those having role in the spell-out process.

### I. Syntax-phonology Interface features: Adger and Svenonius (2010)

Adger and Svenonius (2010) assumes the existence of features that play a role in two modules and they collectively refer to as *interface features*. Under the heading *Features and the interfaces*, they discuss the connection of features visible to syntax and the systems interfacing with syntax. As far as the syntax-phonology interface is concerned, they indicate the possibility of features including instructions to the S-M system and that “One way in which features might connect to the S-M (Sensory-motor) systems is if they correspond to instructions to the spell-out procedure, for example in specifying that a head be spelled-out to the right of its complement (for a head-final structure)...” (Adger & Svenonius, 2010, p. 29).

Within Adger & Svenonius (2010), three classes of features are discussed and categorized as *syntax-phonology interface features* and they involve linearization, non-pronunciation and the correspondence between prosody and information structure<sup>90</sup>. Of importance are the first two kinds of features and on which I will shed some light below.

#### a. Where to spell-out a word (Linearization)

These are features with instructions regulating where to spell-out a word resulting in *different options in the spell-out of chains and of heads*. According to Adger & Svenonius (2010), an example of such a kind of interface features is Brody’s (2000a, b) diacritic \* which decides the position wherein the set of heads or *functional sequence* T-v-V is spelled-out as a morphological word (MW) and an illustration of this is the French verb movement represented as T\*-v-V . Brody’s \* in their own measures is an interface feature because it is present in syntax “but

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<sup>89</sup> The assumed interface features are discussed here disregarding their source, that is, whether these features belong to the lexicon or are part of the computational system itself.

<sup>90</sup> According to them we can think of the focus feature as “a feature, present in syntax, which carries an instruction to the phonology (pronounce loud) and to the semantics (place in focus)” (Adger & Svenonius, 2010, p. 32).

simply instructs the phonological component where to spell-out a word" (Adger & Svenonius 2010, p. 31).

b. Not to spell-out (Non-pronunciation)

The feature in question is Merchant's (2001) E feature which is an interface feature with the instruction *not to spell-out at all* (this feature is discussed below in some detail).

## II. González-Vilbazo and López (2012)

This study shares the same line of thought found in Adger and Svenonius (2010) in that González-Vilbazo and López assume that some interface properties as linearization and information structure and, this time, even prosodic structure, are dependent on some features. However, the new addition of this work is that they confine these features to phase heads as the loci of parametric variations.

Using code-switching data mainly from a variety called Esplugish, González-Vilbazo and López (2012) indicates that the phase head little *v* coming from L1 imposes its complement VP from L2 to follow the pattern of L1 in word order, prosodic phrasing as well as information structure. Hence, variations are attributed to a feature of a phase head and we can talk about three types of features as far as their study is concerned namely, features determining linearization, prosodification and information structure<sup>91</sup> and I will discuss only the first two processes for their relevance.

a. Where to spell-out a word (Linearization)

Accordingly, little *v* carries a binary feature that determines whether the object (XP) should be placed to the left or the right of the verb, and thus order is only determined when little *v* merges with VP.

b. What to spell-out in a specific language

There is a feature of little *v* that determines the accent and prosodic phrasing of its complement. Consequently, whether the verb and object will be phrased together (German) or separately (Spanish) depends on the instruction of little *v*.

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<sup>91</sup> According to them, whether a background constituent is expressed by de-accenting as in English or by dislocation as in Spanish is dependent on a feature in little *v*.

### III. A feature flagging a constituent for not spelling-out: Merchant (2001)

Merchant (2001) shows that sluicing involves a CP with an IP missing. Merchant shows that the missing IP is provided by overt syntax as usual<sup>92</sup> but it does not get pronounced. To account for this phenomenon, Merchant (2001) assumes the existence of a single feature called E feature which triggers deletion of IP<sup>93</sup> at PF and to quote the author's own words “E issues an instruction to the PF system to skip its complement for purposes of parsing and production” (Merchant, 2001, p. 60). More specifically, this E feature moves from I to a [+wh,+Q]C head where it gets checked, licensing the ellipsis.

However, there are two assumptions presented in this work which are of importance to me. Below, I will present these two assumptions and show that such assumptions can still be incorporated into a framework as that of González-Vilbazo and López (2012) whereby phase heads (in this case C) are the locus of features, mainly spell-out features.

- a. The E feature can also be of C itself<sup>94,95</sup>

Significantly, the view that a [+wh,+Q]C can have a feature with specific instruction regarding the spell-out of its complement IP, reinforces the view pursued in this dissertation that (many) variations in what is (not) spelled-out can be accounted for as resulting from the different though limited (interface) features phase heads may instantiate. Thus, the E feature can end up being integrated into a framework that assumes the view that phase heads are the locus of parametric variations.

- b. The “feature that triggers (this) deletion at PF is present at LF” (Merchant, 2001, p.14)<sup>96</sup>. Assuming this, one can go on to assume that the E feature is syntax-

<sup>92</sup> “Sluicing in particular, in contrast to the more often studied VP-ellipsis, clearly shows syntactic dependencies that require that certain structures that are not audible nevertheless be present in the syntax.” (Merchant, 2001, p. 55).

<sup>93</sup> The assumption here is that IP is present in syntax but is unpronounced.

<sup>94</sup> The author indicates in a footnote that “Equivalently, the feature could start on C, not being moved there from I at all. In this case, we would state the checking requirement of E as a feature compatibility requirement” (Merchant, 2001,p. 60)

<sup>95</sup> Still, not any C can have the feature triggering deletion of its sister at PF, only a null [+wh+Q]C head can have this feature.

<sup>96</sup> That is, a single E feature that imposes deletion at PF, also imposes a (Focus) semantic condition on its complement. According to Merchant, the easiest way to implement this is that E includes instruction that its complement escapes spell-out and thus ends up “unpronounced by virtue of a semantic relationship with an antecedent” (Merchant, 2001, p.231). For exact details see section 2.2.1 in Merchant (2001).

phonology-semantics interface feature associated only with a [+wh,+Q] C phase head, carrying the instruction to phonology to skip spell-out of its complement IP and furthermore imposing a semantic condition:

- Focus condition on IP-ellipsis:

An IP  $\alpha$  can be deleted only if  $\alpha$  is e-GIVEN (Merchant, 2001, p. 31)

By and large, my assumption that the E feature can be a lexical property that C can have<sup>97</sup>, by the virtue of being a phase head and hence locus of parametric variation, aims at restricting variations in spell-out options to differences in the features phase heads can exhibit.

To conclude, this part highlights the notion of the existence of what I call spell-out features. These features play a role at the interface by including different (though limited) instructions regarding the spell-out procedure determining whether to spell-out a constituent or not (Merchant, 2001) and in case spell-out is option, deciding not only where to spell-out a word (Brody, 2000; González-Vilbazo & López, 2012) but even and more importantly what to spell-out (González-Vilbazo & López, 2012).

#### *4.3.1.3 On The Genuineness of the Notion of Different (Though Limited) Mapping Algorithms and the Assumption That Mapping Algorithms Can Be the Functions of Phase Heads.*

The following are some of the motivations, both empirical and conceptual, in support of the proposed function of the type of spell-out applying.

##### *4.3.1.3.1 Conceptual Motivations*

###### *A. Conceptual motivation in support of the existence of different mapping algorithms*

The idea of the existence of different mapping algorithms to account for the syntax-phonology interface at the  $\phi$  level is not a new one and it gets stressed by the existence

<sup>97</sup> This assumption may get reinforced by taking the following two points into consideration:

- 1-The fact that the conditions under which an IP can go missing are sensitive to the kind of features present on the C sister of the IP since only a null [+wh,+Q] C head can trigger deletion.
- 2-The fact that both IP and VP can undergo deletion resulting in IP/VP ellipsis. IP and VP are nothing but the complements of the phase heads C and  $v^*$  which probably issue instructions to skip the spell-out of their complements.

of different interface approaches employing different mapping algorithms to account for phonological domains formation. The main mapping algorithms assumed in (direct and indirect reference) theories developed within the X-bar syntax are: lexical XPs and their edges, the head-complement relation, c-command relations, constituent edges and finally branchingness (as a syntactic concept). All these mappings as it is suggested by their very names are defined in relation to certain types of syntactic information.

#### B. Conceptual motivation in support of the view that the (strong) phase heads are the loci of parametric variations

Before defining the conceptual motivation in favor of phase heads as the loci of parametric variation, I want to highlight the fact that the notion of the role of parametric variation in determining the way MaPs are constructed from syntax is not a new one. This notion has been employed by the end-based, the most prominent interface theory. Within this theory, as indicated earlier, two parameters are defined to play a role in the syntax-phonology mapping: the edge-parameter<sup>98</sup> and the government parameter<sup>99</sup> (Hale & Selkirk, 1987)<sup>100</sup>. It is only later on that these parametric choices of alignment and government get re-analyzed as OT constraints, namely the Align (Selkirk, 1995) and Wrap (Truckenbrodt, 1995) constraints respectively. The position I assume in this dissertation is that the alignment and government parameters can still be maintained within the new spell-out-based theory, though not in their original form. They are now the functions of a phase head.

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<sup>98</sup> Languages are parameterized as to whether the left or right alignment is relevant in the syntax-phonology mapping.

<sup>99</sup> Hale and Selkirk (1987) suggests that exempting lexically governed XPs from triggering  $\phi$  boundaries is a parametric choice.

<sup>100</sup> Consequently, languages are parameterized not only as to whether the left or right alignment is relevant (see Selkirk, 1986; Selkirk & Shen, 1990), but even, and in the first place, as to whether lexical government is relevant for a particular language or not (Hale & Selkirk, 1987). Thus, while in a language as Chi Mwi:ni, where lexical government does not matter, the right edge of each XP coincides with a  $\phi$ -boundary resulting in the phrasing (VO) $\phi$  (O) $\phi$ , in a language as Papago (Tohono O'odham), where lexical government matters, it is the right edges of XPs that are not lexically governed that coincide with a  $\phi$ -boundary resulting in the phrasing (VOO) $\phi$ . For more details see Truckenbrodt (1995) and Hale and Selkirk (1987).

On theoretical grounds, attributing (some of) the phonological phrasing possibilities languages exhibit to the type of features a phase head may instantiate seems a more plausible option specifically within the standard minimalist trend to restrict parametric variations to the lexicon. To borrow a term from Richards (2004) though with a somewhat different connotation, placing variability in the lexicon (or numeration) *where it more naturally and unavoidably belongs* is more optimal than placing it in the computational system itself. Parameters are thus seen within the minimalist approach as *inherently connected to features of functional heads*. This view is made explicit by the following minimalist quotations:

- a. “Parametric variation is restricted to the lexicon, and insofar as syntactic computation is concerned, to a narrow category of morphological properties, primarily inflectional” (Chomsky, 2001, p. 2)<sup>101</sup>
- b. “The availability of variation [is restricted] to the possibilities which are offered by one single component: the inflectional component” (Borer, 1984, p. 3).
- c. “With the abandonment of parameterized principles in favor of a uniform C<sub>HL</sub><sup>102</sup>, crosslinguistic variation is restricted under MP to the properties and features of lexical items (in particular, to those of functional categories)<sup>103</sup>” (Richards, 2004, p. 18).

*a* and *b* above then take the shape of an axiom that comes to be known as the *Borer-Chomsky conjecture* defined below.

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<sup>101</sup>The notion of parametric variations being restricted to the lexicon is also reinforced in Chomsky (2004) where he indicates that “Σ is assumed to be uniform for all L; NS is as well, if parameters can be restricted to LEX (as I will assume)” ( Chomsky, 2004, p. 107). One thing to indicate here is that, and in the same page, Chomsky adds that “ϕ, in contrast, is highly variable among LS” which seems at the first glance irreconcilable once we assume the best case scenario where there is a single cycle only. However, the two assumptions can be reconciled by assuming the role of phonological factors in reshaping syntactic domains which is a well-attested phenomenon and this is may be why Chomsky assumes that NS and semantic component are uniform but not the phonological component. Another possible way of approaching the variability in the phonological component is to assume the existence of some parameters in phonology to decide post-syntactically what can be finally shaped into a phonological domain, a view entertained in Kratzer and Selkirk (2007). However, this is a departure from the assumption that all parameters are lexical in nature.

<sup>102</sup>Syntactic component.

<sup>103</sup> Richards (2004) states this in footnote 11, p. 18.

- The Borer-Chomsky Conjecture (BCC)

All parameters of variation are attributable to differences in the features of particular items (e.g., the functional heads) in the lexicon (Taken from Roberts & Holmberg, 2009, p. 55).

Being so, the notion of phase heads coming from the lexicon with different features or instructions determining what can be spelled-out is a compatible one assuming the current minimalist assumptions. Giving my proposal a template, it can thus be read as: phase heads can come from the lexicon with different, though limited, spell-out instructions expressed as features, regulating the application of spell-out to their domains and resulting in either small or large spelled-out domains.

#### 4.3.1.3.2 Empirical Motivations

##### A. Empirical motivations in support of the existence of different mapping algorithms

- 1- Languages/dialects with identical syntax but different phonological phrasing possibilities
  - i. Hale and Selkirk (1987)

The fact that there exist languages/dialects with identical syntax but different phonological phrasing patterns undoubtedly suggests that the differences in phonological phrasing are not always the consequence of syntactic variations (e.g., movements) but rather of some parameters in effect. This is not to mean that syntactic variations as movements cannot result in differences in phrasing. The main idea here is to defend the assumption that differences in p-phonological phrasing can also be the outcome of genuine mapping (spell-out) algorithms. This idea is clearly expressed in Hale and Selkirk (1987)<sup>104</sup> who emphasize the role of a parameter of directionality in the formation of MaPs.

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<sup>104</sup> It is notable to know that the main insight in Hale and Selkirk (1987) is the emphasis on the need for a parameter in expressing the dependence of phonology on syntax. They, therefore, propose the existence of a directional end parameter for the formation of prosodic constituents from syntactic categories and assume its existence to be a must “directionality must be available as a parameter in the syntax-phonology mapping” (Hale & Selkirk, 1987, p. 180).

Hale and Selkirk (1987) discusses major phonological phrasing in two different dialects of Chinese namely Xiamen and Shanghai. Although these two dialects have same syntax, they differ in the formation of their MaPs: Xiamen forms a MaP by the option that the right edge of a MaP must coincide with the right end of each maximal projection, while Shanghai forms its MaP via the option that the left edge of a MaP must coincide with the left end of each maximal projection.

	V	Y'
		NP
	N	
X <sub>max</sub> [: (tchiwu)	( nin )	<i>Shanghai</i>
bully	people	
X <sub>max</sub> [: (k'iah	tian-yah)	<i>Xiamen</i>
watch	movie	

To conclude, this work gives us empirical evidence for the fact that variation in p-phrasing can be the result of some genuine mapping algorithm, taking here the shape of a directional end parameter.

## ii. Seidl (2001)

Seidl (2001) indicates that Chichewa, Chi Mwi:ni and Kiswahili are all asymmetric Bantu languages which share the following characteristics:

- Verb movement only to an Aspect head (head-to-head raising as in Baker (1988)).
- Overt movement of IO to Spec vP to check case on *v*.
- No movement of the DO because it gets inherent Case.
- Cliticization in the phonology of Tense and the subject-marker with the rest of the verb (p. 93).

Seidl, also, indicates that the phrasing in asymmetric languages as Chi Mwi:ni and Kiswahili is  $(V\ NP)\phi$   $(NP)\phi$ . Chichewa, however, has the phrasing pattern  $(V\ NP\ NP)\phi$ . To explain the difference in phonological domain structure between Chichewa and other asymmetric languages, Seidl indicates that the difference lies in *domain construction* specifically in the way the edges of theta-domains project.

- Edge rule (parameter):

Either left or right edges of theta-domains project a corresponding boundary onto the prosodic plane (Seidl, 2001, p.76).

Accordingly, the difference between Chichewa and other asymmetric languages as Chi Mwi:ni depends on the way theta-domains can project, that is, the mapping algorithm a language employs. As Seidl puts it “While in Chi Mwi:ni, the theta-domain projects a left bracket, in Chichewa it projects a right bracket” ( Seidl, 2001, p.102).

- 2- One language but two different phonological phrasing possibilities: Recursion in Kimatuumbi.

Another piece of evidence suggesting the fact that variations in p-phrasing can be the function of a genuine (though recursive) mapping mechanism is indicated by the fact that a single language - a single syntax- can exhibit two patterns of constructing a single phonological level. The language in question is Kimatuumbi (Truckenbrodt, 1995, 1999) and the level constructed in two different ways is the MaP level of the prosodic hierarchy. According to Truckenbrodt’s analysis, Kimatuumbi has two rules namely shortening and phrasal tone insertion (PTI). Although the two rules have two different domains, the two domains are still *natural candidates* for the MaP level due to their dependency on XP syntax. The domain of shortening is accounted for by the constraint Align-XP, R whereas that of PTI is accounted for via Wrap-XP resulting in a recursive structure as it is shown below.

- Kimatuumbi:  $[_{VP} V\ NP\ NP]$  Align-XP,R , Wrap-XP >>NonRec

$(( \quad )\phi \ )\phi \quad *$

(Truckenbrodt, 1995, p. 122)

B. Empirical motivation in support of the assumption that the mapping algorithms can be the functions of phase heads.

1- Code-switching data: González-Vilbazo and López (2012 )

González-Vilbazo and López (2012) states that when in code-switching little  $v$  and its complement belong to two different lexica, the phonological phrasing along with some other grammatical properties of the complement will be those of the language from which little  $v$  comes. Specifically, using code-switching data from Esplugish<sup>105</sup>, González-Vilbazo and López indicate that in Esplugish little  $v$  comes from Spanish (L1) and its meaning is *do*, while the complement of little  $v$  (i.e., lexical VP) comes from German (L2). They show that the grammatical properties of the complement VP (headed by a lexical verb) including phonological phrasing follow the Spanish system and thus conclude that little  $v$  as a phase head is the locus of parametric variations.

The main assumption in their theory is that there are different types of little  $v$  which are members of the universal lexicon and can determine properties of their complements. They assume two kinds of little  $v$ :  $v_{dt}$  for German and  $v_{sp}$  for Spanish. Since, little  $v$  in Esplugish is  $v_{sp}$ , the phonological structure in addition to the verb-complement order follow the Spanish pattern, though the VP is composed of German lexical items.

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<sup>105</sup> A variety spoken in a community of German/Spanish bilinguals.

### Example (2)

<i>i- vdt</i> : German pattern of phrasing: (OV)	( x ) ( x ) ϕ
	JUAN hat die BÜcher verkauft
	Juan has the books sold
<i>ii- vsp</i> : Spanish pattern of phrasing: (V)(O)	( x ) ( x ) ( x ) ϕ
	JUAN ha venDido los Libros
	Juan has sold the books
<i>iii- vsp</i> : Esplughish pattern of phrasing: (V)(O)	( x ) ( x ) ϕ
	Juan ha hecho verKAufen die BÜcher
	Juan has done sell the books
	Juan has sold the books.

(González-Vilbazo & López, 2012, pp. 42-43)

#### 4.3.2 The Point (Timing) of Spell-out: Early vs. Late Spell-out

Generally speaking, the assumption pursued here is that the timing of spell-out is determined by phase heads in different though limited ways. The main idea to be developed here is that the timing of spell-out can determine not only the amount of structure processed but even and more importantly the size of the spelled-out domain as we shall see. A similar notion is found in Gallego(2010) who shows that the delay of spell-out via PIC2 as a timing principle allows a process of phase sliding which redefines the boundaries of the  $v^*P$  phase integrating more structure.

Broadly speaking, this whole part dwells on the function of the timing of spell-out which is in itself an attempt in the direction towards answering our old question of *what constitutes a spell-out domain in a particular language?* It will be shown that the answer to this question depends partly on the timing of spell-out. After establishing the factor of the timing of spell-out, we will finally be in a position to provide a full answer for the question of what can constitute a spell-out domain in a language? Under the heading of *what constitutes a spell-out domain*, it will be proposed that what constitutes a spell-out domain, or to put it in other words the size of a transferred unit, is the result of the interaction of both the type of spell-out applying and the timing of spell-out relevant.

#### 4.3.2.1 Establishing the Notion of Early vs. Late Spell-out (Mapping)

The notion of early vs. late mapping is one that finds a basis within both syntactic and interface theories.

##### A. *Within interface theories*

###### 1- Seidl (2001)

Seidl (2001) assumes the existence of early and late parses to which rule types can refer, resulting in two types of rules:

- a. Early rules: apply to earlier parser, have smaller domains and insensitive to performance factors<sup>106</sup>.
- b. Late rules: apply to a later parser, have larger domains and are more liable to show sensitivity to performance factors.

###### 2- Pak (2005)

The following are the main ideas enjoyed within Pak (2005)

- a. “phonological rule domains may be defined at different stages in the derivation from syntax to phonology” (Pak, 2005, p. 315).
- b. Two kinds of phrasal rules are defined :Type 1 and Type 2
- c. “Type 1 domains are defined earlier, under a different set of conditions, and have little in common with Type 2 domains other than the fact that they are both intermediate in size” (Pak, 2005, p. 314)
- d. Type 2 rules domains are specified at a later stage than Type 1 rules domains and tend to have intonational-phrase properties as phrasing can depend on non-syntactic factors as speech rate and constituent length.

##### B. *Within syntactic theory*

###### 1- Chomsky (2001)

Within the framework of Chomsky's (2001), two timing conditions on spell-out are defined namely PIC1 and PIC2. PIC1 entails a sort of ASAP form of spell-out

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<sup>106</sup> Worth mentioning is that Kaisse (1985) indicates the existence of direct-syntax rules or P1 rules which resemble early rules within Seidl (2001) in that both show no sensitivity to phonological considerations. In fact, Kaisse (1985) assumes two kinds of rules: direct-syntax or P1 rules and fast speech or P2 rules and indicates that P1 rules apply earlier than P2 rules.

or early spell-out while PIC2 forces a form of late spell-out that increases the memory load as compared with PIC1.

i. Phase Impenetrability Condition: First version (PIC1)

The domain of H is not accessible to operations outside HP; only H and its edge are accessible to such operations (Chomsky, 2001, p. 13).

[Given structure [ZP Z ... [HP α [H YP]]], with H and Z the heads of phases].

ii. Phase Impenetrability Condition: Second version (PIC2)

The domain of H is not accessible to operations at ZP; only H and its edge are accessible to such operations (Chomsky, 2001, p. 14).

[Given structure [ZP Z ... [HP α [H YP]]], with H and Z the heads of phases].

As it can be easily noticed, the notion of early vs. late is manifested and employed by both interface and syntactic theories. Marrying the facts within the syntactic and interface theories, the result is a new derivational approach of the interface where interface facts find their support in the syntax proper. The following are some of the assumed consequences of such a new combination:

- I. Within the new derivational approach and building on the assumption of the optimality of both PIC1 and PIC2, the notion that phonological domains can be specified at different points of the derivation, with early rules domains defined earlier and late rules domains specified at a later stage of the derivation, finds a suitable case.
- II. Two points of spell-out can thus be defined and their motivation lies in Chomsky's PIC1 and PIC2:
  - a. Early point of spell-out: It is the point whereby a spell-out domain is spelled-out as soon as its head and edge are merged.
  - b. Late point of spell-out: It is the point whereby a spell-out domain is not spelled-out until the head of another (strong) phase is merged.
- III. Languages with early spell-out are languages the spell-out of which is regulated by PIC1 and languages with late spell-out are languages whose spell-out process is governed by PIC2.

- IV. Early rules operate on syntactic domains defined by PIC1 (or domains derived from these syntactic domains and which are specified by some parameters/spell-out instructions).
- V. PIC1 is consistent with the notion of earliness as it forces transfer to the interface to happen by the completion of a phase and thus it is a good candidate to account for early rules which apply early and show no sensitivity to phonological considerations of weight or speech rate<sup>107</sup>. However, the intuition pursued in this study is that PIC1, or to be more accurate the early spell-out via PIC1, can account not only for rules/languages that show no sensitivity to weight considerations but also for those rules/languages that exhibit simplex patterns of branchingness and this is due to the fact that spell-out via PIC1 allows the incorporation of some structure namely one cycle say  $v^*P$ .
- VI. Late rules operate on syntactic domains defined by PIC2 (or may be some derived domains from these syntactic domains and these derived domains are specified by some parameters/spell-out instructions).
- VII. PIC2 or specifically the delay of spell-out via PIC2 allows the integration of more structure and thus complex performance effects can come into play and this makes PIC2 a good candidate to account for languages which show sensitivity to phonological weight and rate of speech. The delayed spell-out via PIC2 until the next strong phase level, say CP, thus brings account for the observation made by Pak (2005) that type 2 rules (late rules), but not type 1 rules (early rules), tend to have intonational-phrase properties as spell-out is delayed till the C level where all clausal constituents have merged. This hence accounts for the fact that some languages show global and complex patterns of restrictions on weight (i.e., on the size of  $\emptyset$ ).

Within the new framework defined above, the early and late parses assumed within Seidl (2001) can have now a good justification as they fall as a natural result of the spell-out process itself. Accordingly, languages (rules) can vary as to whether PIC1 or PIC2 is the one dominating the spell-out process. Moreover, this notion will later in this chapter be

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<sup>107</sup> This can be termed phonological islandhood. PIC1, as the only early spell-out condition within the Chomskyan framework, is the best candidate to account for cases of phonological islandhood.

combined with the assumption that spell-out can also vary as to the type of spell-out applying namely, partial or full, and both of these factors will define a more general mechanism of spell-out that can finally help us to tackle the question of what constitutes a spell-out domain in a particular language.

#### 4.3.2.1.1 More to the Point: Svenonius (2001)

Svenonius (2001a) proposes a modified model of spell-out different from that regulated by the PICs within Chomsky (2001). His (early) spell-out model rests on the assumption of spelling-out phrases (not strong phases) once they are *ready*. Although his algorithm of spell-out is assumed to be of the *earliness* kind as he himself names it, in effect, this algorithm can also result in a very delayed kind of spell-out and this follows from the fact that spell-out of a maximal projection never occurs until its head reaches its landing site which can be very late as it is the case in Norwegian, a languages with V-to-C movement.

- (Early) Spell-out :

A maximal projection can go to spell-out when:

- (i) it contains no unvalued features and
- (ii) its head has reached its *final landing site*

Despite the fact that I am not intending to follow his proposed spell-out algorithm of spelling-out maximal projections as I still follow Chomsky's PIC algorithm<sup>108</sup>, I do assume the notion that head movement must be included in the mapping algorithm. Specifically, I assume that head movement can in some cases affect the size of the transferred unit as it delays spell-out though in ways still predicted by PIC2.

The importance and relevance of Svenonius' study to the topic at hand lies in his implementation of the notion of early vs. delayed spell-out and its implication as it finally helps him to account for the fact that some languages as Norwegian tend to have OS due to having a delayed spell-out while others as English do not have such movement due to the fact that they have early spell-out allowing VP to go to spell-out early and inhibiting OS to occur. The assumption here, as it is quoted below, is that incorporating more

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<sup>108</sup> I follow Chomsky's PIC algorithm though with one modification namely a strong phase head (specifically  $v^*$ ) belongs to its spell-out domain and can undergo transfer along with its complement in some languages.

structure allows more optionality in movement and vice versa, and if we go by the same logic we can also conclude that the incorporation of more structure imposed by the delay of spell-out can also result in optionality in phonological phrasing due to the fact that factors as length and rapidity of speech can come into effect.

“I suggested that the difference between constructions which allow such movement and those which do not is in part a function of how much material is sent to Spell-out at once; if a lot, then a lot of ‘optional’ movement is possible; if a little, then little optional movement is possible” (Svenonius, 2001, p. 19).

To wrap up, this study strengthens the assumption pursued in this dissertation regarding the role of the timing of spell-out. It also strengthens the assumption within interface theories as that of Seidl (2001) of the necessity of the existence of (at least) two parses to capture differences and consequences resulting from an instance of spell-out applying early, incorporating less structure and hence allowing less optionality, and an instance applying later and consequently incorporating more structure and resulting in more optionality.

#### 4.3.2.2 Timing of Spell-out

##### 4.3.2.2.1 A New Proposal: A Perspective That Has Phase Head as Its Premise

I assume here that the spell-out process is initiated by phase heads and that the point of spell-out can vary in ways predicted by Chomsky’s PIC1 and PIC2. However, I embrace one assumption from Svenonius (2001) regarding (phase) heads though with some restriction. The assumption I embrace is that for spell-out to apply, the phase head must have reached *its final landing site*<sup>109</sup>. The restriction I adopt here is that the assumption that spell-out can only happen when a phase head has reached its landing site holds only for languages in which the (phase) head undergoes spell-out along with other elements in its domain due to some spell-out instruction of the phase head itself, but not for languages in which the (phase) head is not spelled-out along with its domain. French, for example,

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<sup>109</sup> Svenonius (2001) assumes that for a phrase (not phase) to undergo spell-out, its head must have reached its final landing site. However, and since I still assume the phase theory (Chomsky, 2001), I assume here that for the domain of a phase to undergo spell-out, its head must have reached its final landing site.

is a language with  $v^*$ -to-T movement and a phonological phrasing of the type (V)φ (O)φ and thus the assumption here is that the object can undergo early spell-out via PIC1 within the  $v^*P$  phase disregarding whether the phase head  $v^*$  has reached its landing site or not.

More specifically, I assume that the timing of spell-out is determined by phase heads in at least two ways:

- 1- Phase heads as transfer triggers: Only strong phase heads determine points in the derivation at which spell-out can be attempted via either PIC1 or PIC2.

“ As conceived by Chomsky, phases (C and  $v^*$ ) represent points at which the existing syntactic object is accessed and evaluated by the interface components, thereby rendering the domain (complement) of the previous phase inaccessible to further operations, in accordance with (some version of) PIC.” (Richards, 2007a<sup>110</sup>, p. 4).

- 2- Whether PIC1 or PIC2 will be in effect is something determined by strong phase heads (mainly  $v^*$ ) by considering two interacting factors:

- a. Phase heads as the Loci of Spell-out feature <sup>111</sup>

I propose that when phase heads enter the derivation, and as transfer triggers, they trigger spell-out in ways predicted by PIC1 and PIC2, and that whether spell-out will happen via PIC1 or PIC2 depends on the spell-out instruction discharged by a phase head directly upon merge. Hence, phase heads  $v^*$  and C have a complex role as they are both the spell-out triggers and the dischargers of spell-out instructions (i.e. the determiners of which units may get spelled-out) at the same time. Thus, one can conclude that  $v^*$  and C, as transfer triggers, trigger spell-out of the units determined by the instructions discharged by them on merge.

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<sup>110</sup> “DERIVING THE EDGE: WHAT’S IN A PHASE?”

<sup>111</sup> An assumption developed in detail in this chapter in the part dwelling on the type of spell-out applying.

- b. The fact that a (phase) head has *reached its landing site*<sup>112,113,114</sup>

The assumption here is that if a phase head is to undergo spell-out along with its domain due to the spell-out instruction of the phase head itself, it must be ensured that the phase head needs no longer be available for head movement, that is, it must have *reached its landing site*.

The view here is that whether PIC1 or PIC2 will be the one in effect is something that depends on the way **a** and **b** above interact. Thus, and as far as the phase head  $v^*$  is concerned, the predictions for a mono-transitive structure VO are:

- I. If  $v^*$  includes instructions to phrase the verb and object separately, then PIC1 must be the one in effect resulting in early spell-out.
- II. If  $v^*$  includes instruction to wrap the verb and object together, then the prediction is that spell-out can apply either via PIC1, which ensures V-to- $v^*$  movement, or PIC2, which ensures  $v^*$ -to-T movement.

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<sup>112</sup> See Chapter 3 of this dissertation for more details on the role of head movement.

<sup>113</sup> The fact that a (phase) head *has reached its landing site* is assumed here to be ensured via syntactic head movement. However, there is another way of ensuring Svenonius' *a head reaching its landing site* in terms of some an interface feature (Adger & Svenonius ,2010) or a diacritic @ (Brody, 2000) which indicates the spell-out position of the set of heads V-  $v^*$ -T.

<sup>114</sup> Worth mentioning here is that the role of head movement in defining the timing of spell-out, and sometimes in widening the spell-out domain, finds support in the following studies:

1-Svenonius (2001a,b):

Svenonius (2001a, b) stresses the role of head movement in the process of spell-out. According to him, A maximal projection can go to spell-out when:

- (i) it contains no unvalued features and
- (ii) its head has reached its *final landing site*

2- Gallego (2010): Phase sliding

According to Gallego (2010), “(some instances of) head movement have an effect on the way syntactic domains are transferred” (p. 51) as they redefine phase boundaries.

3-Den Dikken (2007): Phase extension

“Syntactic movement of the head H of a phase  $\alpha$  up to the head X of the node  $\beta$  dominating  $\alpha$  extends the phase up from  $\alpha$  to  $\beta$ ;  $\alpha$  loses its phasehood in the process, and any constituent on the edge of  $\alpha$  ends up in the domain of the derived phase  $\beta$  as a result of Phase Extension” (p. 1)

In a nutshell, the crucial assumption here is that a phase head discharges its spell-out instruction/s on merge, resulting in two potential points of spell-out, namely PIC1 and PIC2, and as follows.

- a. Upon the merger of a phase head say  $v^*$ , it discharges its spell-out instruction/s and spell-out is attempted at this step via PIC1. If a constituent (the whole domain of spell-out<sup>115</sup> or some parts of the domain) defined by the spell-out instruction of the phase head as  $\phi$  is ready, early spell-out is practically triggered via PIC1.
- b. If, on the other hand, and on the merger of  $v^*$ , spell-out is attempted via PIC1 but the constituent defined by the spell-out instruction of the phase head is not ready because: 1- the constituent defined as  $\phi$  includes the phase head (due to the spell-out instruction of the phase head itself to define a phase head  $v^*$  and other element/s in the spell-out domain onto a single  $\phi$ <sup>116</sup>) and 2- the phase head  $v^*$  has not reached its final landing site T. Thus,  $v^*$  ( $V-v^*$ ) cannot undergo transfer with its domain at this stage. Consequently spell-out is delayed till the merger of the head of the next strong phase C and this delay ensures that the head  $v^*$  reaches its landing site T (resulting in phase sliding). Spell-out is then attempted and finally accomplished via PIC2<sup>117</sup>.

#### 4.3.2.3 Possible Manifestations/Motivations of Late Spell-out: PIC2 Dominance

##### 4.3.2.3.1 Phonological Manifestations/Consequences of the Delayed Transfer via PIC2

Phonologically speaking, I assume that PIC2 is essential to account for languages which I collectively call *languages with late spell-out*. The delayed transfer via PIC2, I assume,

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<sup>115</sup> For  $v^*$ , the whole domain means (VO) for a mono-transitive sentence and (VOO) for a di-transitive sentence.

<sup>116</sup> Resulting in (VO) $\phi$  for mono-transitives and (VOO) $\phi$  for di-transitives.

<sup>117</sup> In a word, late spell-out happens in languages with  $v^*$ -to-T movement and whose phase head  $v^*$  has the instruction that the verb and other elements in  $v^*$ 's domain be spelled-out together, thus, these languages are better accounted for via PIC2 plus the assumption of phase sliding.

has the effect of increasing not only the structure processed but even the structure transferred.

The assumption here is that PIC2 is more consistent with the fact that some rules (languages) tend to have larger domains and are bound to show (more) sensitivity to phonological considerations of weight and speech rate. These rules are known as *late rules* and are assumed to apply to a late parser within the framework of Seidl (2001). The assumption pursued here is that the spell-out process in these languages/rules is regulated by PIC2, rather than PIC1, as spell-out via PIC2 allows the incorporation of more structure. The two main consequences of increasing the structure processed via PIC2 delayed spell-out are:

*A. Increasing the structure transferred*

- i. PIC2 allows a (strong) phase head specifically  $v^*$  ( $V-v^*-T$ ) to undergo interpretation along with other elements in its domain via ensuring that the (phase) head needs no longer be available for head movement and thus it accounts for the phonological phrasings  $(VO)\phi$  and  $(VOO)\phi^{118}$ .
  - ii. The delay of transfer till the CP level via PIC2 is necessary to account for large domains (which can be as large as a clause) in languages as:
- 1- Xhosa: (Zerbian, 2004)

The main syntactic and phonological facts about Xhosa are:

- a. Zerbian (2004) indicates that the p-phrasing in Xhosa is one where the subject, verb and its two complements are defined as a single MaP namely  $(SVOO)\phi$ .
- b. Seidl (2001) defines Xhosa as a language with V-to-T movement.

The assumption here is that it is the delay of spell-out via PIC2 that allows the mapping of the domain  $(SVOO)$  onto a single MaP. Specifically, spell-out is delayed via PIC2 till C is merged. However, C includes instruction to wrap its domain (i.e., TP) onto a single  $\phi^{119}$ .

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<sup>118</sup> The exact details are presented in Chapter 3.

<sup>119</sup> The exact process of late spell-out I propose for deriving the domain  $(SVOO)\phi$  in Xhosa has been previously discussed in 4.3.1.1.2.

Consider the following example taken from Zerbian (2004) after Jokweni (1995).

Example (3):

(ba-ník' úmam' úkuutyá) φ

SC-give mother food

'They give the mother food' (p. 86).

2- European Portuguese (Elordieta, Frota, Prieto & Vigário, 2003).

The delay of transfer till the CP level via PIC2 is also important to account for the phonological phrasing in European Portuguese. Elordieta et al. (2003) indicates that the prosodic phrasing in European Portuguese is (SVO)<sup>120</sup> as most utterances are produced as a single prosodic phrase and only a long branching<sup>121</sup> subject favors the phrasing (S) (VO). Worth mentioning here is that European Portuguese, like Xhosa, is a V-to-T languages (Costa & Galves, 2000). Thus, one can assume for European Portuguese a spell-out scenario similar to that defined for Xhosa earlier in this chapter.

*B. Phonological consequences: The delay of spell-out via PIC2 helps us to find account for the fact that some languages/rules show (more) variability in defining their phonological domains (more sensitivity to phonological weight and speech rate).*

The assumption here is that the delay of spell-out via PIC2, as compared with PIC1, and the subsequent incorporation of more structure, can allow more phonological considerations to come into play. The influences of these phonological considerations can be studied against two criteria:

- 1- Which phonological factors of weight are in play: The notion of late vs.early spell-out helps us find account why languages differ in the way they exhibit

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<sup>120</sup> While the main prosodic phrasing in European Portuguese is defined in this study as (SVO), it is defined as (S) (VO) for both Catalan and Spanish.

<sup>121</sup> The branchingness in effect here is assumed to be prosodic, and not syntactic, in nature as the authors themselves put it that "The phrasing patterns of short branching subjects are similar to those obtained for long non-branching subjects. This result indicates that syntactic complexity does not constrain prosodic phrasing in EP. By contrast, the difference between short and long branching S shows that phonological length plays a role in prosodic grouping: the latter condition favors (S)(VO) phrasings."( Elordieta et al., 2003, p. 3).

sensitivity to phonological considerations of weight<sup>122</sup> as it is implied by the *just*, *at least* and *at most* family of phonological constraints defined in Selkirk (2000) to account for the ways syntactic domains can show sensitivity to phonological weight. Accordingly, the assumption can be that the incorporation of more structure allows complex phonological constraints of weight to come into play, whereas the incorporation of less structure allows simplex weight constraints to come into effect.

- Phonological constraints on phrasing (Selkirk, 2000)

- I. Binary Maximum (MaP): A major phrase may consist of **at most** two minor/accentsual phrases (or words).
- II. Binary Minimum (MaP): A major phrase must consist of **at least** two minor/ accentsual phrases or (or words).
- III. Binary (MaP): A major phrase consists of **just** two minor/ accentsual phrases (or words).

## 2- Variability in phonological phrasing: Sensitivity to speech rate

The assumption here is that languages/rules with late spell-out show (more) sensitivity to speech rate.

To illustrate the role of the incorporation of more structure in determining both the sensitivity to phonological weight constraints as well as the variability in p-phrasing, let us compare the role of these phonological factors in a language where the verb moves only up till  $v^*$ , and according to our measures its spell-out happens via PIC1, with that in a language where the verb moves to T, and in which case the assumption is that spell-out happens late via PIC2, incorporating more structure. The first case can be illustrated by English whereas the second case can be exemplified by Greek.

### ➤ Case 1: English

- a. Interface-wise: A language with the p-phrasing (VO) $\phi$ , a phrasing accounted for
  - earlier via Align-XP,R/Wrap-XP (Selkirk, 2000),
  - and now via the phase head  $v^*$ 's instruction (VO) $\phi$ .

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<sup>122</sup> However, there are languages (rules) which show no sensitivity at all to phonological factors.

- b. Syntax-wise: A language with V-to- $v^*$  movement resulting in early spell-out via PIC1 leading to the incorporation of less structure.
- Case 2: Greek:
  - a. Interface-wise: A language with also the phrasing (VO)φ, a phrasing accounted for
    - earlier via Align-XP,R (Revithiadou & Spyropoulos, 2009),
    - and now via the phase head  $v^*$ 's instruction (VO)φ.
  - b. Syntax-wise: A language with  $v^*$ -to-T movement resulting in late spell-out via PIC2 and hence the incorporation of more structure.

These two cases will be tested against the following two factors:

- i. Which phonological factor of weight is in play: Min (at least) MaP, Max (at most) MaP, Binary (just) MaP.
- ii. The ranking of these weight factors in relation to interface factors.

- English:
  - i. The phonological factor in effect in English is Binary (**just**)MaP (Selkirk, 2000)
  - ii. Ranking: Align-XP, R, Wrap-XP >> Binary (just)MaP (Selkirk, 2000)
- Greek :
  - i. The phonological factor in effect in Greek is Binary (**Min**) MaP (Revithiadou & Spyropoulos, 2009).
  - ii. Rankings: Two ranking options are available (Revithiadou & Spyropoulos, 2009)
    - a. Align-XP,R >> Binary(Min) MaP (slow speech)
    - b. Binary(Min) MaP >> Align-XP,R (normal to fast speech)

The comparison above between English and Greek in a way supports the assumption of the role of head movement in deciding when spell-out can happen in languages in which the phase head  $v^*$  is to undergo spell-out along with its domain. Spell-out in English as a V-to- $v^*$  language is assumed to happen via PIC1, ensuring the head reaching its final landing site, and resulting in the incorporation of less structure than that in languages with  $v^*$ -to-T and hence shows less sensitivity to phonological

factors of length as the phonological factor in effect is Binary (**just**) MaP which plays only a secondary role in shaping phonological domains in English as it is indicated by the tableau below.

**Tableau (1): The tableau is for the sentence *She loaned her rollerblades to Robin***

	Wrap-XP	AlignXP,R	BinMap
[She [loaned] [ her r̄ollerblades]NP [to R̄obin]PP ]			
☞ (She loaned her r̄ollerblades to R̄obin)MaP		*	*
☞ (She loaned her r̄ollerblades)MaP (to R̄obin)MaP	*		*
(She loaned)MaP ( her r̄ollerblades)MaP (to R̄obin)MaP	*		**!*
(She loaned)MaP ( her r̄ollerblades to R̄obin)MaP	*	*!	*

(Selkirk, 2000, p. 245)

Spell-out in Greek, on the other hand, and as a language with *v*\*-to-T movement, is predicted here to occur via PIC2 which delays spell-out allowing head movement to T to take place and leading to the processing of more structure. Greek consequently exhibits more sensitivity to performance consideration which is suggested not only by the fact that the phonological factor Binary (**Min**) MaP is the one in effect, as compared with English which has Binary (**just**) MaP in effect, but also by the availability of two rankings: one is end-based mapping and emerges in slow speech and the other is a binarity-based mapping and emerges in faster speech rates.

#### Example (4)

o pános                    ðÍni                    efxés                    me                    kártes  
 the Panos –NOM give- 3SG wish-ACC.PL with card- ACC.PL  
 ‘Panos sends wishes with cards.’ (Revithiadou & Spyropoulos, 2009, p. 215)

- The two possible phonological phrasings for the sentence mentioned above are:

a - Syntax-phonology mapping (End-based algorithm)

[o pános]ϕ [ðÍni efxés]ϕ [me kártes]ϕ

b- Binarity-based mapping (Dominance of prosodic weight considerations in normal to rapid speech rates)

[o pános ðÍni]ϕ [efxés me kártes]ϕ

Worth mentioning here is that the variability in sensitivity to phonological considerations (of weight and speech rate) can range from:

1-allowing two mappings to exist: where one of the mappings is interface-based and dominates in slow speech, and the other exhibits the dominance of phonological considerations and occurs in fast(er) speech as it is the case with Greek (see Revithiadou & Spyropoulos, 2009),

2-to having phonological weight as the driving force as it outranks the syntax-phonology mapping (constraints) and Egyptian Arabic (Hellumth, 2004) is the right example to illustrate this case as the prosodic minimality constraint Binary Minimum (MaP) outweighs Align-XP, R resulting in the fact that the most common realization of an SVO sentence in EA is within a single prosodic phrase in both slow and fast(er) speech rates.

- ✓ Greek : Revithiadou and Spyropoulos (2009)

Two Rankings are available: a. Binary Minimum (MaP)<sup>123</sup>>> Align-XP,R

b. Align-XP, R >> Binary Minimum (MaP)

- ✓ EA (Egyptian Arabic): Hellmuth (2004)

Ranking: a. Binary Minimum (MaP) >> Align-XP, R

It is notable to know that both Greek<sup>124</sup> and Egyptian are languages with *v*\*-to-T movement. Phonologically speaking, Greek and Egyptian are better accounted for via PIC2 which allows the incorporation of more structure and hence the introduction of complex phonological factors. Luckily, PIC2 is needed independently of phonological phenomena as the delay in spell-out via PIC2 is syntactically and empirically needed and this victoriously highlight the view that spell-out is defined upon the same criterion both syntax-wise and phonological-wise.

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<sup>123</sup> A constraint entailing that a major phonological phrase must consist of at least two minor/accidental phrases or words.

<sup>124</sup> In Biberauer & Roberts (2008), Greek is defined as a language with V-to-T movement and null subjects.

#### 4.3.2.3.2 Non-Phonological Manifestations/Motivations of the Delayed Transfer via PIC2

The delay of spell-out via PIC2 is needed outside phonology as it has a key consequence of increasing the structure processed and even transferred which is empirically and syntactically needed as it will be shown below. Following Richards (2004), the main consequence of assuming PIC2 is that T shares its search space with  $v^*$  rather than C and to quote his own words “the move from PIC1 to PIC2 is nothing more than an assertion that T has a closer relation with  $v$  than with C for the purposes of cyclic spell-out” (Richards, 2004, p. 69). This assumption has at least the following two consequences.

##### *A. Allows agreement across strong phase boundary: Empirical evidence*

Empirically speaking, the delay of spell-out via PIC2 serves to allow agreement across boundaries of strong phases. The case of agreement across a strong  $v^*P$  phase boundary is exemplified by Icelandic *DAT-NOM* constructions involving quirk subjects and nominative objects. Accordingly, T agrees in number with a nominative argument inside VP and across a  $v^*P$  phase boundary.

##### Icelandic DAT-NOM constructions:

- a. Her <sub>DAT</sub> T [ $v^*P$  bored<sub>3pl</sub> [ DP they <sub>NOM</sub>]]]
- b. Agree (T, they) →

[T<sub>φ</sub>, (EPP)]... DP[<sub>φ</sub>, <sub>case</sub>]] (taken from Richards, 2007, p. 108)

Such cases are what motivate the introduction of PIC2 by Chomsky (DbP) in the first place. PIC1, on the other hand, does not allow the possibility of T probing into the complement of  $v^*$  as the complement must have already been transferred by the completion of the  $v^*P$  phase.

##### *B. Allows a process of phase sliding via $v^*$ -to-T movement: (Gallego, 2010)*

The delayed spell-out by PIC2 is also essential in a process known as phase sliding in NSLs (Gallego, 2010). According to Gallego (2010), “Chomsky’s PIC2 predicts the possibility for languages displaying  $v^*$  movement to redefine the  $v^*P$  phase boundaries” (Gallego, 2010, p. 111) and the main consequence of assuming PIC2 is once again that “Ts is present in  $v^*$ ’s LA” (Gallego, 2010, p. 110).

➤ **Phase sliding:**

- i. Definition: According to Gallego (2010),  $v^*$ -to-T movement<sup>125</sup> pushes the phasehood of  $v^*$  up to T triggering a process of *phase sliding*. Phase sliding as Gallego defines it “is updating Chomsky’s (1986a) idea that V-movement is a device to redefine syntactic boundaries” (Gallego, 2010, p. 142).
- ii. Motivation: Within the phase theory context, Gallego assumes that  $v^*$ -to-T movement is triggered by C which has a [tense] feature to be valued. However, the [tense] feature of T intervenes between C as a probe and the goal  $v^*$  which is assumed here to have a valued instance of tense. Consequently,  $v^*$  has to move to  $T_s$ , *destroying the minimality effect created by  $T_s$* , so that C can match it.
- iii. Timing: A delayed transfer: cyclic transfer will not get rid of VP until C is merged (as predicted by PIC2).
  - a.  $[_{v^*P} EA \; v^* \; [VP \; V \; IA]]]$  Cyclic transfer waits (under PIC2)
  - b.  $[CP \; C \; [TP \; T_s \; [_{v^*P} EA \; v^* \dots]]]$  C is merged
  - c.  $[CP \; C \; [TP \; v^*-T_s \; [_{v^*P} EA \; t_{v^*} \dots]]]$   $v^*$  moves to  $T_s$  (anti-minimality)
  - d.  $[CP \; C \; [TP \; v^*-T_s \; [_{v^*P} EA \; t_{v^*} \dots]]]$   $v^*$  triggers cyclic transfer of  $v^*P$  (not VP!)

(Gallego, 2010, p. 109)

iv. Consequence

The delay of transfer via phase sliding – itself via  $v^*$ -to-T movement- in NSLs redefines the  $v^*P$  phase boundaries resulting in increasing in the amount of the structure that is transferred on the first phase as the complement of the phase head  $v^*$  is now  $v^*P$  rather than VP as it is indicated above. Phase sliding has a key consequence for the syntax of EAs in NSLs as “... the Case feature of EAs must be checked before the CP phase proper is over, so that C cannot establish Agree with them. If correct, the prediction is that, contrary to what we see in English, subjects in NSLs cannot be used

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<sup>125</sup> Worth mentioning here is that head movement is assumed within Gallego (2010) to be a syntactic process.

to value Pesetsky & Torrego's (2001) C's T feature." (Gallego, 2010, pp. 112-113).<sup>126</sup>

To conclude, my assumption that head movement specifically  $v^*$ -to-T movement can result in a delay in spell-out whose consequences are phonologically attested thus gets now both syntactically and empirically reinforced.

#### *4.3.2.4 Possible Manifestations/Motivations of Early Spell-out: PIC1 Dominance*

The first intuition one can get is that PIC1 can be used to account for languages whereby T does not need to share a search space with  $v^*$ .

##### *4.3.2.4.1 Phonological Manifestations/Consequences of the Earliness of Transfer via PIC1*

PIC1 entails that spell-out does not happen until the  $v^*$  level is present and thus incorporates less structure as compared with PIC2. As the only earliness spell-out candidate within Chomsky (2001), PIC1 can be used to account for languages/rules with domains of small/intermediate sizes and which show no/less sensitivity to phonological factors.

As it has been discussed earlier in this work, spell-out in English, as a V-to- $v^*$  language, has been proposed to happen via PIC1, and thus the prediction is that it shows less sensitivity<sup>127</sup> to phonological considerations of weight and this prediction is borne out within Selkirk (2000) as the phonological constraint of weight Binary (just) MaP plays only a secondary role in defining the surface phonological phrasing in English.

Other examples can be (colloquial) French, a language with V-to-T movement, and the Aŋlɔ dialect of Ewe, a variety that has V-to- $v^*$  movement. Both French and Aŋlɔ dialect of Ewe have the p-phrasing (S)φ (V)φ (O)φ and show no sensitivity to prosodic branchingness (see Dobashi, 2003, 2004 for more details). I will only elaborate on

<sup>126</sup> One point to mention here is that Gallego (2010) adopts a modified version of Chomsky's (2008) uF-inheritance whereby uFFs are not removed from C but rather generated in C and then SHARED with (passed down to) Ts.

<sup>127</sup> That is, English shows less sensitivity to phonological factors of weight as compared with languages with  $v^*$ -to-T movement as Greek and Egyptian which are assumed to be accounted for via PIC2.

(colloquial) French<sup>128</sup>, and phonologically speaking, the two main characteristics of French relevant here are:

1- It is a language with small domains as its surface phonological phrasing is (S)φ (V)φ (O)φ (Dobashi, 2003).

It is argued that liaison in (colloquial) speech is an example of external sandhi and thus reflects the basic phonological phrasing in French. Liaison is a situation where a word-final consonant is pronounced if it is followed by a word that begins with a vowel. The following two examples are taken from Dobashi (2003) after Selkirk (1974).

#### Example (6)

a. Les immigrés / envoyayaient / des letters / à leurs familles.

The immigrants sent        indef. letters    to their families.

“The immigrants were sending letters to their families” (p. 43).

b. L’ immigré / envoyait / un paquet / à sa famille.

The immigrant sent        a package    to his family.

“The immigrant was sending a package to his family” (p. 44).

Liaison fails to apply between the subject and the verb in the first example as well as between the verb and the object in the second example indicating that there is a phonological phrase boundary between the subject and the verb in the first example as well as between the verb and the object in the second example. Thus, the p-phrasing in French is (S)φ (V)φ (O)φ.

2-It is a language in which phonological phrases do not have to branch as Inkelas and Zec (1995) indicates and this is because “the preference for branching phrases is so weak or nonexistent that it apparently never causes non-branching complements to phrase phonologically with heads” (p. 543). Dobashi (2003) also indicates that the p-phrasing in (colloquial) French is always (S)φ (V)φ (O)φ disregarding branchingness of arguments

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<sup>128</sup> Syntactically speaking, the verb is in T in French, the object is in situ (Dobashi, 2003), and the subject is in Spec, TP (Narita & Samuels, 2009).

<sup>129</sup> <sup>130</sup>. Within my study, PIC1 can be used to spell-out the phonological facts in French<sup>131</sup>. This is due to the assumption that although French is a  $v^*$ -to-T language, spell-out

<sup>129</sup> Dobashi (2003) assumes that the phonological phrasing in Colloquial French and the Añjɔ̄ dialect of Ewe is always  $(S)\phi (V)\phi (O)\phi$  due to the fact that the prosodic branching condition  $[\omega\omega]\phi$ , preferring phonological phrases to consist of at least two phonological phrases, is off in these languages.

<sup>130</sup> However, Narita and Samuels (2009) indicates that the p-phrasing in French is as follows.

French:  $(S)\phi (V)\phi (O)\phi$

$(S V)\phi (O)\phi$	If S is non-branching
$(S)\phi (VO)\phi/(O V)\phi$	If O is non-branching
$(S O V)\phi$	If S and O are non-branching (p. 5)

Narita and Samuels (2009), however, seems to assume and employ (non-)branchingness as a syntactic condition rather than as a prosodic one. The role of syntactic branchingness gets even reinforced in "From syntax to phonology: phi and phases", where Samuels claims that *syntax predicts phonological phrasing* and that *there is no need for restructuring parameter in PF mapping*. If I interpret her correctly, what Samuels perhaps aims to say is that syntactic branchingness directly affects phonological phrasing, viz, it is part of the mapping itself. The role of syntactic branchingness in determining phonological phrasing is assumed in literature as some linguists argue that syntactic complexity or branchingness can play a role in phonological phrasing. To mention some, Nespor and Vogel (1986) employs a restructuring rule (though branchingness is not here part of the mapping as it only indirectly influences phrasing through restructuring) to help them account for the fact that a non-branching complement can optionally phrase together with a preceding verb. Another study assuming the role of syntactic complexity though this time in relation to Subjects (as well as Adjuncts) is Uriagereka (1999). However, branchingness in Uriagereka's MSO model is a part of the mapping algorithm as it directly affects the p-phrasing since left-branching (complex) specifiers, and unlike simplex specifiers, are mapped separately onto their own prosodic phrases.

<sup>131</sup> One point to add here is that if major phonological phrasing in Ewe and French consists of small domains  $(S)\phi (V)\phi (O)\phi$  and if these domains show no (phonological) branching sensitivity, then the facts are really better spelled-out via PIC1's early spell-out mechanism (especially if one takes into account the fact that the object in these languages is in situ as indicated in Dobashi (2003, 2004)). However, the question that raises itself here is that whether one can generalize at this point the assumption that languages with spell-out via PIC1 tend to have small (or intermediate) domains that exhibit less sensitivity to phonological considerations (English) or no sensitivity at all (Ewe and French)? Once case of relevance to consider here is Italian which though defined as a language with small domains  $(S)\phi (V)\phi (O)\phi$ , it still exhibits (optional) sensitivity to branchingness resulting in the optionality of the phrasing  $(S)\phi (VO)\phi$  in the case the object is non-branching. There are, however, two ways to approach the nature of the branchingness requirement in Italian and fortunately these two ways, if not to support the assumption above, they at least seem not to contradict it. The exact details are below.

**I. Branchingness is syntactic:** The first way to approach the surface phonological phrasing in Italian is via the relation-based mapping algorithm and according to which the basic phrasing pattern is predicted as  $(S)\phi (V)\phi (O)\phi$ . However, there is also an optional restructuring rule (Nespor & Vogel, 1986) that adjoins the object to the verb if it is non-branching or consists of only one word. (Non-)branchingness is defined here as a syntactic notion (though it takes effect only indirectly via restructuring).

- *Italian: Relation-based mapping (Nespor & Vogel, 1986)*
  - a.  $(S)\phi (V)\phi (O)\phi$
  - b.  $(S)\phi (VO)\phi$  if the object is non-branching

The new phase-based counterpart of the relation-based account I assume here entails that PIC1 is the right candidate to spell-out the facts about Italian not only because Italian exhibits small domains (i.e.,  $(S)\phi (V)\phi (O)\phi$ ) and thus the prediction is that only the object will undergo spell-out within the  $v^*$  phase (the object is in situ as Dobashi (2003) indicates), but also because branchingness is syntactic rather

happens early via PIC1 due to the fact that only the object will undergo spell-out within the  $v^*P$  phase<sup>132</sup>.

#### 4.3.2.4.2 Non-Phonological Manifestations/Motivations of the Earliness of Transfer via PIC1

##### A. *Conceptual Motivations*

###### i. Reduction in computational complexity

The main conceptual argument for PIC1 is the conceptual argument for having phases at all namely the reduction of computational burden by allowing to periodically *forget* parts of the derivational information which would otherwise be kept in active memory for a longer time. Svenonius (2001b) indicates that early spell-out may be motivated by a principle of *Minimize Information*. The idea is that if the derivation has to keep

than phonological which copes with the insensitivity to phonological factors predicted by the earliness of spell-out via PIC1.

**II. Branchingness is phonological:** However, the second way to approach the surface phonological phrasing in Italian is via the end-based mapping algorithm and according to which the basic phrasing pattern is defined as  $(S)\phi (VO)\phi$  by Align-XP,R. Moreover, Ghini (1993) also indicates that a second factor enters into  $\phi$ -formation in Italian namely a prosodic requirement of binarity. Ghini (1993) indicates that at an average rate of speech, a MaP in Italian contains two phonological words. Worth mentioning is that Dobashi (2003) also uses branchingness as a prosodic requirement while discussing Italian (though he follows the relation-based account in assuming that the basic phonological phrasing in Italian is  $(S)\phi (V)\phi (O)\phi$ ). As it is indicated above in footnote 129, Dobashi (2003) employs the prosodic branching parameter  $[\omega\omega]\phi$ , and though this parameter is assumed to be off in Ewe and French, it is on in Italian.

- *Italian: end-based mapping (Ghini, 1993)*

a. $(S)\phi (VO)\phi$

b. $(S)\phi (V)\phi (O)\phi$  if the object is branching (if it consists of two phonological words)

The new phase-based counterpart of the end-based account above entails that PIC2 is the one to account for the facts in Italian particularly if one assumes that 1- $v^*$  in Italian has the instruction to wrap the verb with its complement onto a single  $\phi$  and 2-the verb movement to T results in phase sliding and thus the verb and object get spelled-out in the滑动 phase onto a single domain  $(VO)\phi$ . However, the delay of spell-out via PIC2 allows the phonological factor  $[\omega\omega]\phi$  to come to play and thus a two-word object can be defined as a separate  $\phi$ . The subject, on the other hand, will exhibit no restructuring even if it is non-branching because it is a Topic (Narita & Samuels, 2009).

Before to conclude, I want to indicate that the questions of whether the branchingness (if any) that matters for languages with early spell-out is syntactic or phonological in nature and whether this branchingness requirement is a part of the mapping itself or it applies via restructuring is something beyond the scope of this study. Assuming with many existing theories (e.g., Dobashi, 2003, 2004; Ghini, 1993) that what appears to be a syntactic branchingness requirement is actually a prosodic weight requirement, then what I am attempting in this part is to defend the idea that languages with small or intermediate domains defined by early spell-out via PIC1 tend to show no sensitivity (Ewe& French), less sensitivity (English) or limited sensitivity (Italian) to considerations of weight.

<sup>132</sup> The assumption here is that only the object undergoes spell-out due to the spell-out instructions of the phase head  $v^*$  and the effects of these instructions amount to that of Align-XP,L within the end-based.

track of whatever is in the workspace, then sending it to spell-out reduces the computational burden.

### ii. Compatibility with feature inheritance

Feature inheritance is a new conception of phases assumed within Chomsky's OP and according to which C and  $v^*$  are the locus of uFs (phi-features)<sup>133</sup> and these uFs are then downloaded from phase heads to non-phase heads (complements) via a mechanism of feature inheritance. Richards (2007) indicates that the rationale for having feature inheritance *only goes through under PIC1* since it ensures the Value-Transfer simultaneity (and hence Full Interpretation). Below are the two premises from which the feature inheritance follows.

1. Premise 1: Value and Transfer of uF must happen together.
2. Premise2: The edge and nonedge (complement) of a phase are transferred separately (Richards, 2007, p. 122)

### iii. (More) Consistent with island effects

Islandhood has been linked with the notion of early spell-out within existing spell-out-based models be it Chomsky's spell-out model (2000, 2001) or Uriagereka (1999).

#### a. Chomsky (2001)

Although Chomsky's both PICs render the complement of a phase head opaque (island), PIC1 results in the spell-out of the complement domain much earlier than PIC2.

#### b. Uriagereka's early spell-out (1999)

Unlike the Chomskyan model of spell-out, what gets early spelled-out in Uriagereka's (1999) model is the non-complement and this early transfer induces islandhood. More specifically, complex specifiers and adjuncts undergo non-complement reduction and thus should always exhibit islandhood.

#### c. Narita and Samuels (2009)

Employing a hybrid schema of Chomsky's (2001) and Uriagereka's (1999) MSO models, Narita and Samuels show empirically that early spell-out of the

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<sup>133</sup> As opposed to Chomsky's (2001) DbP whereby T and  $v^*$  are the locus of phi-features.

complement via complement-reduction (Chomsky's PIC1) and early spell-out of non-complement via non-complement reduction (Uriagereka, 1999) are both options available in the world grammars rendering the domain early spelled-out an island (opaque). They also show that their approach does better accord with the phonological phrasing facts (see Narita & Samuels, 2009 for details and examples).

**d. Boeckx (2011, 2012)**

- “Island effects arise due to the specific format of instructions sent to the interfaces (both SEM and PHON); specifically, they are a side-effect of PIC1, a side effect of cyclic mapping...” (Boeckx, 2011, p. 7).
- “A side-effect of immediately spelling out certain structures is that certain elements within these see their fates being sealed ‘too early’. Although nothing in syntax prevents these elements from moving, the external systems that receive early information about them take that information to be complete, and set these elements aside, effectively turning them into islands.”(Boeckx, 2012, p. 120)

**e. PIC1 and phonological islandhood**

One point to mention here is that the opacity induced by the early transfer via PIC1 finds support in the fact that (some) languages assumed to be accounted for via PIC1 exhibit phonological islandhood by showing (relative) insensitivity to phonological branchingness as it has been shown while discussing the phonological manifestations of the early transfer via PIC1<sup>134</sup>.

## *B. Empirical Motivation*

The reality of the role of earliness in defining domains finds support within the framework of Svenonius (2001a) though earliness this time is motivated by the elimination of uninterpretable features on a constituent (XP) and the fact that its head has reached its landing site, rather than being a consequence of PIC1 being in effect. Accordingly, this notion of earliness helps Svenonius to empirically account for the fact that a language as Norwegian allows OS (object shift) due to spell-out being

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<sup>134</sup>Moreover, Uriagereka's (1999) early spell-out approach has been used by interface studies as Revithiadou and Spyropoulos(2009) which defends the idea of the isomorphism between the syntactic and phonological islandhood of clitic-doubled DP-objects in Greek .

delayed by the verb movement to C, while a language as English does not allow OS to occur due to the fact that spell-out applies early to VP.

#### 4.3.2.5 Move in Serve of a Spell-out Instruction of a Strong Phase Head $v^*$ : A New Assumption

I assume here that some forms of XP movement are not motivated by an EPP feature of a strong phase head mainly  $v^*$  but they are rather motivated by a last resort strategy to accomplish the spell-out instruction of this strong phase head. To borrow a term from Starke (2011)<sup>135</sup>, I call this kind of movement *spell-out-driven movement*. This assumption still fits well with Chomsky's assumption of the possibility of movement iff it has *effect on the outcome* though this time the assumption here is that the sorts of movements involved here may not be motivated by a strong EPP feature of a phase head .

Broadly speaking, the idea here is that movement is invoked in some cases to satisfy some (highly ranked) spell-out preferences/instructions regarding what can be spelled-out (at some stage) and even where to spell-out some element. Hence, an element moves from domain A to domain B simply because it does not belong to domain A for spell-out purposes. Such kinds of spell-out-motivated movements can be mainly defined in relation to the verb's complements. I here assume that the movement of the complement/s (object/s) is forced, not by a strong feature, but because it allows a spelled-out structure to correspond to a surface phonological domain defined by a spell-out instruction of a phase head  $v^*$ . I formulate this assumption/tendency as follows.

- *Last resort XP-movement strategy*

A syntactic movement of an XP (complement) is triggered (forced) if it results in creating the right configuration to spell-out, defined by the spell-out instruction of a strong phase head  $v^*$  (i.e., if it has an effect on outcome).

Thus the main idea assumed here is that some forms of XP movement are not triggered by features or parameters and not even by constraints about movement itself. Movement is simply a last resort strategy that applies *only when necessary* and follows from the type

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<sup>135</sup> According to Starke (2011), *movement happens because you have to create a configuration that is adequate for spell-out*.

or nature of the spell-out instruction included by a phase head. In a word, movement of this type helps to attain a grammatical output defined by a highly ranked faithfulness interface constraint<sup>136</sup>.

I do not have much to say about such movements. However, I mention below a case to which the assumption of the spell-out-driven movement can be extended.

➤ Object movement to Spec  $v^*P$  in Chichewa: Dobashi (2004)

The object movement to Spec  $v^*P$  helps Dobashi (2004) to account for the fact that the verb and object are phrased together in Chichewa. More specifically, the object moves to Spec  $v^*P$  to check the OCC feature of  $v^*$ . This movement results in the evacuation of  $v^*$ 's spell-out domain and, subsequently, the object and verb can then get spelled-out together in the domain of C.

However, what excludes a scenario in which the movement of the object is not triggered by OCC feature of  $v^*$ . That is what if the object movement is but a last resort strategy to help satisfying the spell-out instruction of phase head  $v^*$  regarding how to map its domain onto a  $\phi$ . Thus, I assume here, that  $v^*$  in Chichewa includes the instruction that the verb and object should be phrased together and that the evacuation movement of the object is a last resort strategy that helps creating the configuration defined as a single unit of spell-out by the spell-out instruction of  $v^*$ . Hence, the XP argument movement may be finally a last resort strategy to accomplish the spell-out instruction of a phase head regarding how to map its domain onto a  $\phi$ .

#### 4.3.2.6 The Timing of Spell-out as Guided by General Principles of Computational Economy

Gallego (2010) indicates that “Merge, Agree and perhaps other operations must obey general principles of computational economy” (Gallego, 2010, p. 39). I accordingly assume that spell-out, as other operations, should also obey general principles of

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<sup>136</sup> This assumption is in line with the view that “... there is no place for constraints like STAY, neither in Eval, nor in Gen. Syntactic movement should be evaluated by its effects *only*. It is welcome if it helps fulfilling highly ranked constraints, and disadvantageous if it leads to their violation. But these constraints should not be about movement itself, but about the syntactic consequences of semantic, morphological and phonological relations among words and constituents, like, for instance, wh-phrase placement... prosodic structuring etc” (Vogel, 2006, pp. 108-109).

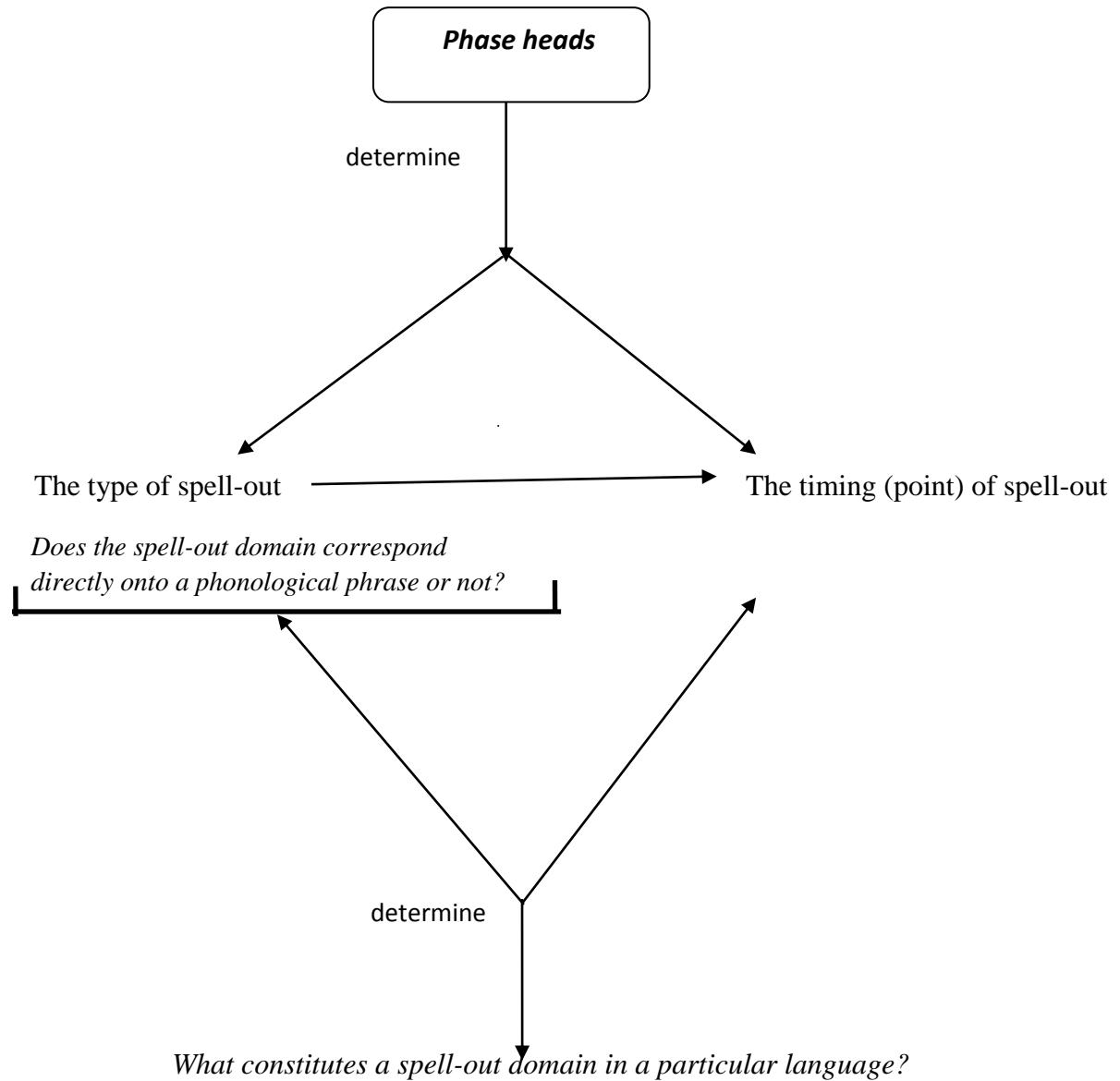
economy. I assume here that the computational economy of transfer takes the shape of PIC1 and PIC2. Accordingly, both PIC1 and PIC2 are equally optimal from the computational perspective, and they have their justification in economy considerations. Both of them are least effort strategies and I assume that whether in a language (or a case) PIC1 or PIC2 will be in effect is language specific. Specifically speaking, both PIC1 and PIC2 serve as economy timing principles that regulate when an operation can or must apply in the derivation.

- 1- PIC1 has its justification in local derivational economy, an economy consideration that arises early resulting in early spell-out and aims at reducing the computational complexity by allowing to forget some parts of the structure. PIC1 can thus be used to account for early rules. What I mean here by early rules is those rules which have smaller domains and may/may not show sensitivity to phonological consideration of speech rate and weight, and in case they show sensitivity, it is generally a simplex one (simple branchingness).
- 2- PIC2 has its justification in a kind of economy that arises late and results in late spell-out. Specifically speaking, PIC2 is driven by a sort of global derivational economy which is still not as global as the Shortest Derivation Requirement. This is because its globality lies in its *lateness* rather than *looking ahead*. The lateness of spell-out allows more structure to be incorporated and thus allows more syntactic operations and phonological considerations to take place which may amount , though in a more logical manner, to the effect of looking- ahead. Consequently, it allows two effects. Syntactically, it allows syntactic agreement between the complement of a lower phase head and elements outside that phase as well as the sliding (extension) of a phase due to the movement of  $v^*$  to T. Phonologically, by delaying spell-out of a lower phase ( $v^*P$ ) until the merger of a higher phase (CP), the post spell-out component may be eliminated as there will be no revision or reconstruction of phrasing by a second pass as nothing will be sent to spell-out until much of the structure as well as speech rate have been incorporated. Thus, PIC2 can be mainly assumed to account for languages with late rules, that is, rules with larger domains and which show more sensitivity to speech rate and phonological weight among others.

#### 4.3.2.7 *What Constitutes a Spell-out Domain in a Particular Language?*

Finally, we are now in a position to answer our old question of what constitutes a spell-out domain in a particular language? or to put it in other words what determines the size of a transferred unit? I assume that the answer to the above-mentioned questions is dependent on the following two factors:

- 1- The instruction/s of a strong phase head regarding the type of spell-out applying
- 2- The timing of spell-out relevant (Early/ Late)



**Figure (1)**

I thus assume that the schema above can result in two types of cases and thus two types of languages. In the first case, we have languages that exhibit evidence for spell-out on both the C and  $v^*$  levels due to the fact that spell-out is accomplished at both strong  $v^*$  and C levels resulting in split domains. This kind of case can be exemplified by the majority of the world languages as English and Chi Mwi:ni (S) $\phi$  (VO) $\phi$ , on the one hand, and French and Ewe (S) $\phi$  (V) $\phi$  (O) $\phi$ , on the other.

However, in the second case, we have languages that show evidence for spell-out only on the CP phase. In this case, we have only one instance of spell-out applying to the domain of C due to two assumptions: 1-spell-out is performed via PIC2, and 2- C includes strong wrapping instruction. This kind of spell-out results in a single domain (SVO) $\phi$ <sup>137</sup> as it is the case in languages as Xhosa (Zerbian, 2004). Worth mentioning here is that if the assumptions relating to single domain construction mentioned here are on the right track, then we perhaps have now the answer for *why is it that many linguists are lead to assume that only CP is phase (in some languages)?* The answer as it is indicated above does not rest on changing the inventory of phases, but it rather relies on minimalist assumptions of spell-out features and the PICs. The following is the derivational scenario I assume that it can account for languages with late and full spell-out as Xhosa.

- *The process of late spell-out via PIC2 with no spell-out on a lower (slided) phase*
  - a. Cyclic transfer waits (under PIC2)
  - b. C is merged hindering, rather than initiating, spell-out on the lower (slided) phase as it comes from the lexicon with instruction to wrap its whole domain onto a single MaP → spell-out on the lower phase is ignored by this higher instruction.
  - c. Spell-out on the CP phase can also be regulated by PIC2 and thus it will be delayed till the merger of another strong phase head.
  - d. If there is no other strong phase head higher than C, then spell-out occurs by the completion of CP (or may be spell-out occurs in the root) and C triggers cyclic transfer of its whole domain (i.e., IP/TP (or C +IP/TP) onto a single  $\phi$ .

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<sup>137</sup> However, the phrasing (S) $\phi$  (VO) $\phi$  can also be predicted here if subject is in Spec, CP. Thus, while the verb and object will be defined as a single domain in the domain of C, the subject will be defined onto a single domain when spell-out applies finally to the root.

In the following part on the feature geometry of C and  $v^*$ , it will be shown how both the split and single domains can be derived by employing the two factors defined above: the timing factor (i.e., whether PIC1 or PIC2 will be in effect) and the type of spell-out features/instructions a phase head may include.

#### *4.3.2.8 A Proposed Feature Geometry for $v^*$ and C*

The goal behind this whole part is to summarize all that have been assumed, argued for and motivated in this chapter.

##### *4.3.2.8.1 A Proposed Feature Geometry for C Supplied by a Derivational Sketch*

Considering all the discussions assumed in this chapter, I define below the spell-out features a phase head C can include. C, accordingly, may or may not include spell-out features. In case C includes spell-out features, these features can be of two types: 1- either to ignore spell-out altogether, 2- or to wrap its whole domain onto a single unit.

###### *1- C Feature I: Not-to-Spell-out C Feature (or E feature)*

- Instruction: Do not spell-out the IP complement of [+wh,+Q] C head (Merchant, 2001).

This feature is presented here just to both instantiate and emphasize the idea that C as a phase head can include different specifications regarding spell-out, but it will not be integrated into the parametric system of C developed at the end of this sub-section as the main aim of that system is to account for the observed phrasing possibilities in the construction of phonological domains.

###### *2- C Feature II: Strong-wrapping-spell-out C Feature (or Full-spell-out C feature)*

- Instruction: Wrap the spell-out domain of a phase head C (IP or what remains of it<sup>138</sup>) onto a single domain  $\phi$ .

This feature can result in what I call *full spell-out* and, if on the right track, this feature can account for the fact that some languages do not show traces of spell-out on the  $v^*P$  phase. As it will be shown below, the assumption of the existence of this feature plus the

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<sup>138</sup> Or perhaps whatever remains of it, if PIC1 is in effect.

assumption that PIC2 is in effect in related languages will suffice to account for the fact that spell-out on the  $v^*P$  phase is obscured.

Notably, and depending on whether PIC1 or PIC2 is in effect, we can distinguish two effects of this wrapping feature:

- a) PIC1 in effect (Early spell-out)
  - i. Instruction: Define (wrap) the domain of a phase head C (i.e., what remains of IP) onto a single  $\phi$ .
  - ii. Consequence: Any spell-out instruction/s of  $v^*$  carried over to the C level will be ignored.
  - iii. Resulting p-phrasing for a di-transitive structure:  $(SVO)\phi(O)\phi^{139}$

The wrapping instruction of C is read this way in the case spell-out applies via PIC1 because when spell-out applies via PIC1, some part of the spell-out instruction of  $v^*$  has already been performed by the merger of  $v^*$ . Thus, when C merges it wraps its domain (IP) onto a single domain, to the exclusion of what has already been spelled-out in the  $v^*P$  phase.

The wrapping effect of C can see the light of the day in the case PIC1 is in effect if  $v^*$  has the instruction to spell-out its domain onto separate units. To illustrate, consider a structure SVOO, with  $v^*$  having the instruction to define its domain onto two domains, one including the lower complement and another including the verb and its higher complement<sup>140</sup>, and C having wrapping instruction. Thus, while the lower object will be spelled-out separately in the domain of  $v^*$ , the verb and its higher complement will be wrapped together with the subject in the domain of C disregarding the instruction of the lower phase head  $v^*$  to spell-out the verb and its higher complement onto a separate domain. It will be shown in Chapter 6 of this dissertation that San'ani Yemeni Arabic is a dialect to which such kind of analysis can be extended as it exhibits the phrasing pattern  $(SVO)\phi(O)\phi$ .

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<sup>139</sup> San'ani Yemeni Arabic exhibits this pattern of p-phrasing as it will be shown in Chapter 6 of this dissertation.

<sup>140</sup> A p-phrasing similar to that predicted by Align-XP,R within the end-based.

b) PIC2 in effect (Late spell-out)

- i. Instruction: Define (wrap) the domain of a phase head C (i.e., IP) onto a single  $\phi$  (or a prosodic phrase)
- ii. Consequence: Spell-out on the lower  $v^*P$  phase is ignored altogether
- iii. Resulting phrasings:  $(SVO)\phi$ ,  $(SVOO)\phi$

The wrapping instruction of C is read this way since PIC2 delays spell-out till C enters the scene. The wrapping effect of C can be seen in the case PIC2 is in effect and  $v^*$  has the instruction to wrap its domain onto a single unit including the phase head  $v^*$  which has not reached its landing site T. PIC2 thus ensures head movement of V- $v^*$  to T. When C enters the derivation with its instruction to wrap its domain, spell-out on the lower phase, which has not been accomplished yet, is finally ignored by the strong wrapping instruction of the higher C phase head.

Examples:

- One example of this case can be symmetric Bantu languages with V-to-T movement. Seidl (2001) assumes that such languages have the phonological structure  $(SVNP\ NP)\phi$  and that the construction of such structure is “sensitive to a restricted set of edge parameters” (Seidl, 2001, p. 86). Within the new proposal I develop in this work, these parameters are functions of (strong) phase heads.
- Zerbian (2004) shows that Xhosa<sup>141</sup> is a language with the phrasing  $(SVOO)\phi$  where the subject, verb and two complements are all wrapped onto a single MaP.

*3- Featureless C (perhaps a weak Spell-out C Feature<sup>142,143</sup>)*

However, there is also the case where C may not include any instruction regarding the spell-out of its domain, and thus neither spell-out on a lower  $v^*P$  phase will be hindered,

<sup>141</sup>Xhosa is still a symmetric Bantu language.

<sup>142</sup>This kind of C is perhaps featureless in the sense that it includes no instructions (or preferences) regarding the spell-out of its domain. This kind of featureless C may be the most dominant kind due to the fact that, for most cases, we can find evidence for spell-out on the  $v^*P$  phase.

<sup>143</sup>This kind of C results in a form of *partial spell-out* but with a different connotation from that used with  $v^*$ . The term *partial* here does not mean that C includes any instructions to spell-out its domain into different parts as it is the case with *partial spell-out* defined in relation to  $v^*$  since C here is assumed to be featureless. Rather, the term *partial spell-out* is used here to mean that the IP complement of C is always mapped onto smaller domains by either accomplishing spell-out on a lower phase  $v^*P$ , if PIC2 is in effect, or by carrying over the spell-out instructions of  $v^*$  to the C level, if PIC1 is the one in effect.

in the case where spell-out on the  $v^*$  phase is delayed via PIC2 till C merges, nor any spell-out instruction/s of  $v^*$  carried over to the C level will be ignored by C, in the case where PIC1 is in effect. The first case can be exemplified by Chichewa and the second case by French.

Depending on whether PIC1 or PIC2 is in effect, we can distinguish two consequences:

- a. PIC1 in effect: Spell-out instruction/s of  $v^*$  can be carried over to the next level C.
- b. PIC2 in effect: Spell-out on a previous phase  $v^*P$  is always performed (never ignored).
- a. PIC1 in effect (Early spell-out)

PIC1 as usual, and by the virtue of its earliness, has always the effect that spell-out on a lower phase is always performed. To illustrate, let us attempt to derive the p-phrasing (S)φ (V)φ (O)φ in French. Accordingly, I assume that  $v^*$  in French has the spell-out feature/instruction to define the verb and its complement as two separate domains φs and in which case spell-out will be accomplished via PIC1. Thus, while the object will be defined as a φ within the  $v^*P$  phase, the verb will be spelled-out within the CP phase. When spell-out applies to the sister of C, the verb and subject within C's spell-out domain can be mapped together onto a single domain<sup>144</sup> contrary to facts. Worth mentioning here is that the subject in French is in Spec, TP and not a Topic (Narita & Samuels, 2009). Thus, a possible and cheaper way to ensure the surface phonological phrasing (S)φ (V)φ is to assume that the instruction of the lower phase head  $v^*$  is carried over or generalized to the next phase head C (perhaps by some tendency of spreading) resulting in only the verb being spelled-out in the domain of C while the subject will be defined onto a separate domain when spell-out finally applies to the root. This is for me the best way to derive the

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<sup>144</sup> Here, I assume that the subject belongs to the main derivation workspace of the clause as other elements (contra Uriagereka, 1999). Worth mentioning is that the separate phrasing of a preverbal subject can still be accounted for by assuming that it is an island as it assumed within Uriagereka's (1999) model of spell-out where subjects (being non-complements) are independently spelled-out from the main derivation. However, there are many objections in literature against such view as subjects are assumed to be spelled-out by the main derivation and that "Their islandhood is regulated instead by independent principles of the computational system and crucially not because these elements are spelled-out independently from the main derivation" (Revithiadou & Spyropoulos, 2009, p. 228)

surface phonological phrasing of the sort (S)φ (V)φ (O)φ without retaining to any linearization issue as it is the case in Dobashi (2004).

b. PIC2 in effect (Late spell-out)

As indicated before, the assumption here is that PIC2 will be the one in effect in languages where the delay is inevitable to ensure the accomplishment of the spell-out instruction of  $v^*$  to wrap its whole domain (i.e., the verb or V- $v^*$ -T and object/s) together onto a single domain, after the phase head needs no longer be available for head movement. Thus, when C is merged, and via PIC2, the verb (V- $v^*$ -T) and object/s are spelled-out together in the spell-out domain of the slided phase. Spell-out on the slided ( $v^*P$ ) phase is thus performed and not overridden because C includes no spell-out preferences. The subject, however, will be defined as a separate phonological domain since it will be spelled-out in the domain of C, or if it occupies a higher position, it will be spelled-out separately when spell-out applies to the root. Such account can be extended to Chichewa as a language with the p-phrasing (S)φ (VOO)φ (Truckenbrodt, 1995; Dobashi, 2004).

**Summarizing**, and as it is shown above, the proposed featural geometry of C allows us to account for different phonological phrasing possibilities, even those that find no account within the end-based theory itself.

As far as the notion of spell-out features is concerned, we have seen that C as a phase head is assumed to be of the following types:

- 1- C with a *not-to-spell-out* feature.
- 2- C with a *full-spell-out* feature
- 3- *Featureless C*

Putting these features into a parametric system, we end up with something as the following:

- i. Parameter 1: Languages are parameterized as to whether the lexical entry of a phase head C includes instruction regarding the spell-out of its domain or not.
- ii. Parameter 2: In case C includes spell-out instructions, these instructions are strong wrapping instructions and can be of two types:

- a. Either to wrap the whole domain IP onto a single phonological domain
- b. Or to wrap the whole IP domain along with the phase head C onto a single phonological domain<sup>145</sup>.

#### 4.3.2.8.2 A Proposed Feature Geometry for $v^*$ Supplied by a Derivational Sketch

I assume here that the featural geometry for  $v^*$  can include three types of spell-out features whose effects amount to the effects attained by the three well-known end-based constraints *Align-XP/R*, *Align-XP/L* and *Wrap-XP* on VP.

- a. Features triggering Partial Spell-out on the  $v^*$  phase

Partial spell-out on the  $v^*P$  phase here means that the spell-out domain of a phase head  $v^*$ <sup>146</sup>, and due to the instruction of this phase head, is mapped onto split phonological domains or  $\phi$ s and languages of this kind are defined here as languages with partial spell-out. I assume here the existence of two kinds of partial spell-out features whose effects amount to that of the Align-XP/R and Align-XP/L within the end-based.

##### *1- $v^*$ Feature I: Partial-spell-out $v^*$ Feature with the Align-XP,L effect*

$v^*$  here comes from the lexicon with a partial-spell-out feature I which entails that its domain be mapped onto separate  $\phi$ s, that is, the verb and its complement/s be phrased separately. Assuming a VO structure, the mapping goes as follows. When  $v^*$  merges and discharges its spell-out instructions, the object will be spelled-out and defined as a separate  $\phi$  within the  $v^*$  phase. The instruction of  $v^*$  on the spell-out of the verb will be carried over to the C level and the verb will be spelled-out

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<sup>145</sup> One study to consider here is Ott (2011) which assumes the existence of two types of C ( $C_Q$  &  $C_{FR}$ ) with two different options in the spell-out of the head C (i.e., C may/may not undergo spell-out with its complement) depending on the presence or absence of some interpretable feature on C. That is, if C bears some interpretable feature Q,  $C_Q$  will not undergo spell-out with its complement, and remains visible for selection by the matrix predicate. If, however, C does not bear any interpretable feature,  $C$  or  $C_{FR}$  will be spelled-out along with its complement. Extending my assumption of phase heads with different spell-out features (and hence different instructions regarding the phrasing of the head) to his study, we can assume that his  $C_Q$  is one with a spell-out feature that entails that the complement be spelled-out separately, rather than one with some interpretable feature Q, while  $C_{FR}$  is a C with spell-out instruction to wrap C along with its complement. This assumption, if right, is a cheaper one as it makes no use of selection relations.

<sup>146</sup> What I mean by the spell-out domain of a phase head  $v^*$  is the phase head ( $V-v^*$  or  $V-v^*-T$ ) + its complement.

onto a separate  $\phi$  within the C level<sup>147</sup>. The subject will be spelled-out separately when spell-out applies to the root.

- i. Instruction: Define every prosodic word within the domain of  $v^*$  as a separate domain. In the case of a mono-transitive structure, this instruction can be read as:
  - a. Define the complement of the verb as separate  $\phi$
  - b. Define the verb ( $V-v^*$  or  $V-v^*-T$ ) as a separate  $\phi$
- ii. Resulting Phrasing:  $(V)\phi (O)\phi$
- iii. Examples: a. Ewe:  $(V)\phi (O)\phi$  (Dobashi, 2003, 2004)
  - b. French:  $(V)\phi (O)\phi$  (Dobashi, 2003)

## 2- $v^*$ Feature II: Partial-spell-out $v^*$ Feature with the Align-XP,R effect

$v^*$  in this case comes from the lexicon with a partial-spell-out feature II entailing that the spell-out domain of a phase head  $v^*$  be defined onto two separate  $\phi$ s: one including the verb (or  $V-v^*$ ) and its first (highest) complement, and another including the second (lower) complement.

- i. Instructions:
  - a. Define (upon spell-out) the verb and its first complement as a single  $\phi$ .
  - b. Define the verb's second complement as a separate  $\phi$ .
- ii. Resulting Phrasing:  $(VO)\phi (O)\phi$
- iii. Example: Chi Mwi:ni  $(VO)\phi (O)\phi$  (Truckenbrodt, 1995; Zerbian, 2007)

Thus, while the lower complement will be spelled-out via PIC1 and defined within the  $v^*P$  phase as separate domain, the verb plus its highest complement will be defined as a separate domain upon spell-out on the CP phase. The assumption here is that the  $v^*$ 's instruction of defining the verb and its highest complement onto a single domain is carried over to the next strong phase level C resulting in the verb and its highest argument being defined onto a single  $\phi$  within the C phase, excluding the subject which though may belong to the C domain, it gets defined as a separate  $\phi$  when spell-out finally applies

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<sup>147</sup> However, if C includes a wrapping feature, then this results in the phrasing  $(SV)\phi$ . Since the fate of the verb will not be determined until the C level, this partial-spell-out feature I should better be defined as two separate instructions and this will have a welcome consequence when the OT grammar for this featural account is developed in Chapter 5.

to the root<sup>148</sup>. This case can be illustrated with asymmetric languages such as Chi Mwi:ni. Zerbian (2007) defines three Bantu languages with this p-phrasing namely Chi Mwi:ni, Tsonga and Kimatuumbi .

- b. Feature triggering Full Spell-out on the  $v^*$  phase:  *$v^*$  Feature with the Wrap-XP effect*
- $v^*$  in this case comes from the lexicon with a full-spell-out feature demanding that the whole domain of a phase head  $v^*$  be defined onto a single  $\phi$ . Thus, in a di-transitive structure, the verb and its complements will be defined onto a single MaP within the  $v^*P$  phase<sup>149</sup>.
- i. Instruction: Define (Wrap) whole domain of a phase head  $v^*$  onto a single  $\phi$
  - ii. Resulting Phrasing: (VOO) $\phi$
  - iii. Example: Chichewa: (VOO) $\phi$  (Truckenbrodt, 1995; Zerbian, 2007)

**Summarizing**, and as it is demonstrated above, the proposed featural geometry for  $v^*$  allows us to account for all existing phonological phrasing possibilities accounted for earlier by the end-based.

As far as the notion of spell-out features is concerned, we have seen that  $v^*$  as a strong phase head can be assumed to include spell-out instructions of the following types:

1. Full-Spell-out  $v^*$  feature with the Wrap-XP effect
2. Partial-spell-out  $v^*$  feature with the Align-XP/R effect
3. Partial-spell-out  $v^*$  feature with the Align-XP,L effect

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<sup>148</sup> However, if C includes wrapping instruction, we will have a different scenario. As indicated before while discussing the strong wrapping feature of C, this C wrapping feature can override the instruction of  $v^*$  and results in the verb, its highest complement and subject being wrapped onto a single domain within the C domain. The resulting phrasing in this case is (SVO) $\phi$  (O) $\phi$ , rather than (S) $\phi$  (VO) $\phi$  (O) $\phi$ . This phrasing pattern is observed in San'ani Yemeni Arabic.

<sup>149</sup> The verb and its complements will be defined as a single domain  $\phi$  within the  $v^*P$  phase via PIC1 if the verb moves only up till  $v^*$ . However, if the verb moves to T, then the verb and its complements will be defined as a single domain  $\phi$  within the slided ( $v^*P$ ) phase via PIC2 as it is the case in Chichewa which is discussed earlier in Chapter 3 of this work. Worth mentioning here is that in the case where spell-out is performed via PIC2 due to the verb movement to T, another scenario for spell-out raises itself. Accordingly, if C enters the scene and it has a wrapping feature, spell-out on the slided  $v^*P$  phase is ignored and C's wrapping instruction results in the whole domain of C being defined as a single domain  $\phi$ . I assume that this is the case in Xhosa as it will be discussed in the next Chapter( see the section on Xhosa)

Translating these features into parameters we end up with something as the following:

- i. Parameter 1: Languages are parameterized as to whether the lexical entry of a phase head  $v^*$  includes a full spell-out (wrapping) instruction or a partial spell-out instruction.
- ii. Parameter 2: In case  $v^*$  includes a partial spell-out instruction, this instruction can be of two types:
  - a. Either to define every prosodic word in the spell-out domain of  $v^*$  onto a separate  $\phi$ , resulting in a p-phrasing similar to that predicted by Align-XP,L.
  - b. Or to define the spell-out domain of  $v^*$  onto two  $\phi$ s: One including verb (V- $v^*$  or V- $v^*$ -T) and its first complement, and another including the second complement, a phrasing defined by Align-XP,R.

To conclude, this whole section illuminates the idea that the phase theory gives us the right tool to handle all existing phonological phrasing possibilities. As it is shown above, and if I am ever correct, employing the technology of spell-out features as properties of  $v^*$  and C, the phase theory succeeds in accounting for all (and even more) phonological possibilities at the MaP level accounted for earlier by the end-based theory.

#### *4.3.2.9 Towards an OT Grammar*

The following are the main assumptions, I believe, we need to account for variations in MaP-domains construction cross-linguistically. I summarize them here in a more organized way so that I can make use of them in the next chapter when I develop the OT framework.

#### **A. I assume that the featural content of a phase head determines the following:**

- 1- The type of spell-out applying (partial/full): How the elements in the domain of a phase head get spelled-out (onto MaPs).
- 2- The timing of spell-out (Early/late): When does spell-out happen, i.e., via PIC1 or PIC2. The assumption here is that there are two potential spell-out points at which spell-out can be attempted defined by PIC1 and PIC2.
  - i. PIC1 in effect: If spell-out on a phase say  $v^*$  is immediately attempted by the merger of its head via PIC1 and a constituent defined featurally by the phase head  $v^*$  as  $\phi$  is syntactically eligible for spell-out, the phase  $v^*$  is culminated at this point and languages of this type are languages with early spell-out. This

accounts for languages or cases where 1-the verb (in the configurations V-v\* or V-v\*-T) is phrased separately from one or both of its complement/s disregarding head movement and 2-it also accounts for languages where the verb (or V-v\*) is phrased with other elements in v\*'s domain onto a single domain  $\phi$  in languages where the verb does not move beyond v\*.

- a. Instruction to phrase the verb (V-v\* or V-v\*-T) separately from one or both of its complement/s → Early spell-out
- b. Instruction to group the phase head v\* with its domain together onto a single domain in V-to-v\* languages → Early spell-out
- ii. PIC2 in effect: If spell-out on a phase v\* is attempted by the merger of its head (i.e., via PIC1) and the constituent defined featurally by the phase head as a  $\phi$  is syntactically ineligible for spell-out (the head has not reached its landing site), the phase is not culminated at this point and spell-out has to wait till the merger of the next strong phase head (i.e., via PIC2). This kind of spell-out can account for the grouping of the verb with other element/s in v's domain onto a single  $\phi$  in languages with V-to-T movement.
  - a. Instruction to group the phase head v\* with its domain together onto a single domain in V-to-T languages → Late spell-out

**B. I assume that the featural instruction/s of a lower phase head can spread/ be carried over to the next (higher) strong phase level<sup>150</sup>.**

This assumption is a very crucial one. This is because doing without this assumption, it will not be clear how to account for some phonological phrasing possibilities. Assuming an SVO structure, and a phase head C with no spell-out preferences regarding spell-out, two different consequences of the assumption above of feature spreading from a lower phase head v\* into a higher phase head C can be defined depending on whether PIC1 or PIC2 is in effect<sup>151</sup>.

- i. PIC1 in effect: Any remnant spell-out instruction/s of v\* can be carried over to the next level C.

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<sup>150</sup> This can be reflected in an OT account by highly ranking the instruction of a lower phase head say v\*.

<sup>151</sup> See the part handling the Featureless kind of C in this chapter for elaboration.

- ii. PIC2 in effect: Spell-out on a previous phase  $v^*P$  is always performed (never ignored)

**C. The featural instruction of a higher phase head can obscure/override that of a lower phase head<sup>152</sup>.**

This assumption is an important one since it can help us account for the large domains observed in languages as Xhosa and San’ani Yemeni Arabic. Assuming an SVOO structure, and a phase head C with wrapping instruction, two different effects of C’s wrapping instruction can be defined, depending on whether PIC1 or PIC2 is in effect<sup>153</sup>.

- i. PIC1 in effect (Early spell-out)

Consequence: Any remnant spell-out instruction/s of  $v^*$  carried over to the C level will be ignored.

- ii. PIC2 in effect (Late spell-out)

Consequence: Spell-out on the lower  $v^*P$  phase is ignored altogether.

#### 4.4 Summary

This chapter aims at providing the basis for the next chapter by providing the essential logic to re-capture the assumed GB-based mapping constraints employed by the end-based theory within the minimalist framework. The wrap and alignment constraints attain much of success in accounting for variations in the realm of the syntax-phonology interface within the OT framework and thus dispensing with them is not a good option to opt for. This chapter is an attempt to defend the idea that we can still employ these constraints<sup>154</sup> within minimalism by re-defining them as spell-out features (featural requirements) of phase heads. The whole chapter revolves around this idea and attempts to make it as plausible as it could be. One point to add is that, being part and parcel of the spell-out mechanism, the spell-out features, and unlike the end-based constraints, have a derivational basis and consequently place (many) variations in the formation of MaP domains in the spell-out process itself.

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<sup>152</sup> This can be reflected in an OT account by ranking the instruction of a higher phase head say C higher than that of a lower phase head say  $v^*$ .

<sup>153</sup> See the part handling *C Feature II: Strong-wrapping-spell-out C Feature* in this chapter for elaboration.

<sup>154</sup> These constraints are originally parameters that have been recast as OT constraints. However, even in their original parametric shape, the Alignment (Align) and government (Wrap) parameters cannot be integrated into a phase-based account since they are built on notions that run against the essence of minimalism.

## CHAPTER - 5

### A New Optimality-Theoretic Account of the Interface

#### **5.0 Introduction**

Having sketched the derivational side of the assumed spell-out mechanism in the previous chapter, it will be very promising if the spell-out *parametric choices* (parameters), upon which the mechanism is mainly established, can finally be translated into simple OT constraints mimicking those employed within the end-based theory. This chapter is an attempt in this direction viz to formulate OT-counterpart of the spell-out features by postulating a family of violable spell-out constraints. I will also draw a comparison between the new proposed OT constraints and the end-based ones. Moreover, it will be discussed in this chapter how OT constraints are generally more superior to parameters in accounting for variation. I will finally show that the new OT constraints can be practically used to replace the end-based constraints in accounting for the phonological phrasing patterns in Chichewa, Chi Mwi:ni and Kimatuumbi. The new OT grammar will also account for the phonological facts in Xhosa, about which the end-based account has little, if any, to say.

#### **5. 1 Optimality Theory (OT): A Brief Introduction**

Optimality theory is basically a theory of constraints interaction and although the constraints are considered to be universal (part of UG), their ranking and re-ranking do express languages-specific properties. Hence, cross-linguistic variation is the variation in constraints ranking. The core assumptions within this theory can be summarized as follows:

- i. Constraints are universal: Constraints are the constraints of universal grammar.
- ii. Constraints can be violated
- iii. Grammars are particular rankings of these constraints: Ranking of the same constraints may vary from one language to another.
- iv. A different set of constraints may apply in different languages but they are all selected from the same pool of universal constraints.

One point to add here is that Optimality Theory (Prince & Smolensky, 1993) has two types of constraints: faithfulness and markedness constraints. Faithfulness constraints militate against input-output disparity, while markedness constraints impose restrictions on the output without reference to the input.

OT decides the candidate that best satisfies the ranked constraints such that “ An optimal output form for a given input is selected from among the class of competitors in the following way: a form that, for every pairwise competition involving it, best satisfies the highest-ranking constraint on which the competitors conflict, is optimal”(Grimshaw, 2006, p. 34).

## 5. 2 The OT Account of the Syntax-Phonology Interface

### 5.2.1 A GB-Based OT Grammar of the Interface: The End-Based Theory

As it is indicated in Chapter 2, the end-based or edge-based theory (Selkirk, 1995, 2000; Truckenbrodt, 1995, 1999, 2007) is interface theory developed within the OT framework as Selkirk (1995) explores extending the domain of application of ranked and violable constraints (McCarthy & Prince, 1993) to the syntax-phonology area and defines a family of alignment constraints which define edges of prosodic constituents in relation to edges of surface syntactic structures and these constraints are known as the interface constraints. The following constraints are the ones relevant to account for the formation of major phonological phrases from (lexical) maximal syntactic projections.

- Phonological phrase ( $\phi$ )
  - a. Align (*Lex max, L,  $\phi, L$* )
  - b. Align (*Lex max, R,  $\phi, R$* )

Generally speaking, the OT grammar of the end-based theory consists of two sets of constraints: 1-One set includes the interface constraints which consist of the Align constraints (Selkirk, 1995) and the Wrap-constraint (Truckenbrodt, 1995).

2- The other set consists of phonological constraints of weight and balance referred to as the markedness (well-formedness) constraints and the best-known of these constraints are those defined within Selkirk (2000) and Ghini (1993)<sup>155</sup>.

### 5.3 OT and/or Minimalism: A Divergence or a Convergence

In this part, I will summarize the main points discussed in literature regarding the relation between OT and minimalism, particularly those points which have a relevance to the issue of the interface between syntax and phonology.

#### 1- Parameter-setting vs. Constraint system

Generally speaking, and as it has been discussed in previous chapters, minimalism accounts for cross-linguistic variations existing between languages by attributing them to parameters which are *inherently connected to features of functional heads* as it is made explicit by the BCC<sup>156</sup>. OT, on the other hand, assumes language variations to result from languages-specific ranking of *otherwise universal constraints*. The superiority of a constraint-based OT account over a parameter-based minimalist account can be studied in relation to, at least, two cases:

- I. *Variations within a single language*: Importantly, the main disadvantage of assuming a parameter-setting theory is that it has a problem in accounting for variations within a single language and this problem is posited in Truckenbrodt (1995) while discussing phonological phrasing in Kimatuumbi which exhibits a recursive phrasing of the pattern ((VO)φ O)φ. Truckenbrodt thus concludes that a parameter-setting theory “will only derive half of the facts” as compared with a constraint-based theory which “does not have these problems: The relevant factors Align-XP and Wrap-XP are assumed to be present in all languages. Even though in most languages, the effects of one will override the other, it can also be represented that both show their effects in a single language<sup>157</sup>” (Truckenbrodt, 1995, p. 93). Another case against a parameter setting approach to variation is indicated in Truckenbrodt (2007)

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<sup>155</sup> See Chapter 2 for elaboration on these constraints.

<sup>156</sup> Borer-Chomsky Conjecture

<sup>157</sup> According to Truckenbrodt, Chi Mwi:ni is a language where Align-XP overrides Wrap-XP, Chichewa is a language where Wrap-XP overrides Align-XP and Kimatuumbi is, however, a language where both Align-XP and Wrap-XP are in effect resulting in recursive φ structure.

where he indicates that “... in parametric accounts a choice has to be made between left- or right-alignment. Maōri, however, shows simultaneous alignment of left and right edges of XPs. This can be accounted for by ranking both left- and right alignment above \*p-phrase, but it could not be accounted for by parametric theories of alignment”(Truckenbrodt, 2007, p. 438). Moreover, this superiority of a constraint-based analysis gets even reinforced in some studies extending the insight of OT to minimalism as that of Broekhuis and Woolford (2010) and according to who “The introduction of such an optimality-theoretic evaluator eliminates the need for many other devices that are currently used in MP to capture cross-linguistic differences such as language specific filters ... and parameter settings. Ranked violable constraints are superior to parameters set at ‘on’ or ‘off’ for a language as a whole, because parameters do not allow a requirement to hold in some situations, but not in others within the same language” (Broekhuis & Woolford, 2010, p. 30).

- II. Emerging  $\phi$  boundaries under narrow focus: Another disadvantage of depending on parameter-setting theory is defined within Truckenbrodt (1999). According to him, although a parameter setting can derive the default p-phrasing in a language, it may not be able to account for the p-phrasing that emerges under narrow focus. To illustrate this view, Truckenbrodt shows that while the default p-phrasing in Chichewa can be reached within a parametric theory as Hale and Selkirk (1987) by the parametric choice: *XPs that are not lexically governed trigger a p-boundary at their right edges*, this parametric theory has no means to account for the emerging p-boundary between the two objects when the verb is focused. A constraint-based account, employing universal and ranked constraints, however, does not suffer from this shortcoming.
  - i. Default p-phrasing in Chichewa is (VOO) $\phi$   
This default phrasing can be predicted by both constraint-based and parameter- based approaches

- a. Parameter-based  
VP trigger a  $\phi$  boundary to its right by  $Align-XP,R = (VOO)\phi$
  - b. Constraint-based  
 $Wrap-XP >> Align-XP,R = (VOO)\phi$
- ii. P-phrasing in Chichewa when a verb is focused is  $(V)\phi (O)\phi (O)\phi$   
 This pattern of phrasing can be predicted by a constraint-based approach but not a parameter-based one.
- a. Parameter-based: 
$$\begin{array}{ccc} (V)\phi & & (OO)\phi \\ \downarrow & & \downarrow \\ \text{by Focus} & & \text{by } Align-XP,R \end{array}$$
  - b. Constraint-based:  
 $Align-FOC >> Wrap-XP >> Align-XP,R = (V)\phi (O)\phi (O)\phi$
- Moreover, the superiority of a constraint-based account, in this regard, gets reinforced in Broekhuis and Woolford (2010) who make it clear that “Ranked violable constraints are superior to parameters set at ‘on’ or ‘off’ for a language as a whole, because parameters do not allow a requirement to hold in some situations, but not in others within the same language” (Broekhuis & Woolford, 2010, p. 30).

## 2- Derivations or Representations (Broekhuis & Woolford, 2010)

In the following I present a quotation from Broekhuis & Woolford (2010) which handles this issue.

“... let us dispel the common myth that MP intrinsically evaluates derivations, bottom up and step by step, while OT necessarily evaluates completed derivations (representations). Chomsky makes this clear for his version of MP: “Generation of an expression is not strictly “bottom-up,” because of the parallelism of operations. (Chomsky 2007: 6)”; “All operations within the phase are in effect simultaneous”; “their applicability is evaluated at the phase level (Chomsky 2001: 24)”. Prince and Smolensky (1993/2004) designed OT to evaluate completed derivations; however, that work mentions that it would also be compatible with the overarching principles of OT to implement the theory in a different way, with step by step derivation and evaluation (Prince and Smolensky, 1993: 94-95;

see also Heck & Müller 2000 for an early implementation of this idea). A version of this alternative, known as Harmonic Serialism, has been developed recently in McCarthy (2007/2008), who argues that it is more restrictive than classic OT in desirable ways. Under Harmonic Serialism, only one change at a time can occur (e.g. deletion or insertion of a feature) and any change must lead to an improvement, the best possible one-step improvement. Thus the decision as to whether to evaluate completed representations or to evaluate each step of a derivation is independent of whether one works in MP or OT, and, consequently, one might also take either approach in a hybrid theory” (Broekhuis & Woolford, 2010, p. 29).

### 3- OT vs. minimalism: A complementary relation or a rivalry one

- I. Rivalry relation: OT can be conceived as a rival to operation-based theories of the grammar mainly minimalism.

“Optimality Theory, in common with much recent work, shifts the burden from the theory of operations (Gen) to the theory of well-formedness (H-eval). To the degree that the theory of well-formedness can be put generally, the theory will fulfill the basic goals of generative grammar. To the extent that operation-based theories cannot be so put, they must be rejected. [...]”(Vogel, 2006, pp. 101-102, after Prince & Smolensky, 1993).

- II. Complementary relation: Minimalism is the generator and OT is the evaluator. Such view is entertained in studies as Broekhuis and Woolford (2010).The assumption there is that some version of the computational system CHL, and OT can be both combined by assuming that the former is a generative device (generator) and the latter is the evaluator. In their conclusion, Broekhuis and Woolford put it that “... adding an OT-evaluation to MP can be done in a very ‘minimal’ way, simply by introducing the idea that the output of the computational system is filtered in an optimality-theoretic fashion by means of a language-specific ranking of otherwise universal constraints. The introduction of such an optimality-theoretic evaluator eliminates the need for many other devices that are currently used in MP to capture cross-linguistic

differences such as language-specific filters... and parameter settings" (Broekhuis & Woolford, 2010, p. 30).

## 5.4 Two Constraint-Based OT Accounts of the Interface

Two constraint-based accounts are to be discussed below. The first is that of the end-based, and the second is the one I propose and it is based on the spell-out functions discussed in the previous chapter.

### 5.4.1 End-Based OT Account

As it is indicated in Chapter 2, the end-based or edge-based theory (Selkirk, 1995, 2000; Truckenbrodt, 1995, 1999, 2007) is interface theory developed within the OT framework and its OT grammar consists of two sets of constraints, namely, interface constraints and well-formedness constraints.

- The end-based constraints: Two types of constraints can be defined at the MaP level

- I. Faithfullness (interface) constraints: Align and Wrap constraints
  - a. Two alignment constraints
    - i. *Align XP, R*: Align (XP, R;  $\phi$ , R)
    - ii. *Align XP, L*: Align (XP, L;  $\phi$ , L)
  - b. Wrap-XP: Each XP is contained in a phonological phrase
- II. Markedness (well-formedness) constraints: The construction of prosodic structure in some languages cannot solely rely on syntactic information but rather has also to refer to prosodic markedness constraints which regulate the size and eurhythmicity of phrase constituents. The best-known markedness constraints are those defined within Selkirk (2000) and Ghini (1993) discussed in Chapter 2 of this dissertation. Other examples of markedness constraints are:
  - *Min-N-Phrases (rapid speech)*  
Minimize the number of phrases (rapid speech) (Prieto, 2005, p. 216).
  - *Uniformity, restricted*  
Subject and verb are phrased in same length units (Sandalo & Truckenbrodt, 2002, p. 300).

### 5.4.2 New (Spell-out-Based) OT Account

The goal of this part is to develop a constraint-based grammar that can derive (many) existing possibilities in the formation of the MaP domain, assuming the current syntactic assumptions of minimalism mainly the phase theory and its MSO hypothesis. As I have indicated earlier in Chapter 2, the advent of the phase theory and MSO as well as the new assumptions of bare phrase structure partly disadvantages the end-based theory, mainly as a (representational) theory built on the X-bar syntax.

This however does not imply the rejection of the insights of the end-based as an interface theory that succeeds in accounting for many existing phonological phrasing possibilities. The new grammar to be developed here will mimic the OT grammar used within the framework of the end-based theory in many respects. The Wrap and Align constraints succeed in accounting for many cross-linguistic variations in MaP formation and thus any successful constraint-based interface theory should include them as a part of its grammar. Within the phase theory, spell-out is the only defining (mapping) process connecting syntax and phonology and consequently the mapping algorithms *Wrap-XP* and *Align-XP* can now be seen as spell-out functions, and thus have a derivational status. This is attained, as it has been suggested earlier, by the assumption that spell-out is a selective process and its selectivity is a function of a phase head which includes genuine spell-out instruction/s regarding the spell-out and p-phrasing of its domain.

The main idea here is that the spell-out parameters previously defined within my account in Chapter 4 will now be built into a constraint-based framework in the same way the left/right end parameter and the role of government in p-phrasing<sup>158</sup> (Hale & Selkirk, 1987) are reformulated within OT into the Align constraints (Selkirk, 1995) and the Wrap constraint (Truckenbrodt, 1995) respectively. Importantly, and as it has been stated earlier in this chapter, the main disadvantage of assuming a parameter-setting theory is that it has a problem in accounting for variations within a single language and this

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<sup>158</sup> Within the framework of Truckenbrodt (1995), this is referred to as the government parameter and accordingly lexical government may or may not be relevant in a language. The role of lexical government is couched within Truckenbrodt by Wrap-XP. The fact that government is relevant in a language or not is interpreted by the ranking of Wrap in relation to Align constraints: If Wrap is ranked higher, this indicates that government matters in this language, if, on the other hand, Align is ranked higher, this indicates that government plays no role in this language.

problem is posited in Truckenbrodt (1995) who indicates that a parameter-setting theory “will only derive half of the facts” as compared with a constraint-based theory which “does not have these problems ...” (Truckenbrodt, 1995, p. 93).

Having established the proposed spell-out mechanism which runs the gamut from smaller (mapped) domains to larger ones, what remains here is to develop a new constraint system based on this spell-out mechanism. Hence, the sections to follow will be devoted towards both establishing the new constraints and drawing a comparison between them and the well-established constraints employed by the end-based.

However, and since there are some well-known cases in literature in which phonology “does not faithfully interpret syntactic structure, as seen in various cases of non-isomorphism between the two reported in literature” (Guasti & Nespor, 1999, p. 73), some phonological constraints of weight (and speech rate) should be assumed as well. Such constraints are well-established in end-based theories mainly that of Selkirk (2000) and Ghini (1993) and can still be used even within the new constraint-based account. Thus, the new OT grammar, and in line with that of the end-based, will include two sets of constraints defined below.

- The new constraint-based system has two kinds of constraints:
  - I. Faithfulness (spell-out) constraints: These are the spell-out constraints responsible for defining phonological domains, and their exact identity will be developed below.
  - II. Markedness constraints: Phonological constraints on weight and balance (among others).

#### *5.4.2.1 The Mapping of Large and Small Domains: Sketching a Comparison*

If a spell-out-based account is to be a real gain, it should be able to replace the end-based account by recapturing variations at the  $\phi$  level accounted for by end-based via its spell-out-based algorithms. Thus, the syntax-phonology interface mappings used by the end-based should now be accounted for within the new theory of phases by assuming new algorithms defined by the spell-out process itself as the only interface process connecting syntax and phonology.

Basically, the end-based theory predicts variations at the  $\phi$  level to result from two alignment constraints requiring that the left/right edges of (lexical) maximal projections to coincide with the left /right edges of  $\phi$ s. These two constraints regulating the mapping of the MaPs are defined below. According to Selkirk (1995), languages are characterized as having either right-alignment or left-alignment. Examples of languages in which the right edges of syntactic XPs are relevant for the formation of  $\phi$  domains are Chi Mwi:ni (Selkirk, 1986) and Xiamen Chinese (Chen, 1987) whereas examples of languages where the left edges of syntactic XPs are the relevant ones are Shanghai Chinese (Selkirk & Shen, 1990 ) and Japanese ( Selkirk & Tateishi, 1991)<sup>159</sup>.

- Two alignment constraints at the MaP level

1-*Align XP, R:* Align (XP, R;  $\phi$ , R)

2-*Align XP, L:* Align (XP, L;  $\phi$ , L) (Truckenbrodt, 1995)

Align the right/left edge of a (lexical) XP with the right/left edge of a phonological phrase.

However, this is not the end of the story. End-based accounts, especially Truckenbrodt (1999, 2007), use two more constraints to account for the differences in major phonological phrasing cross-linguistically. The first is the constraint \*P-Phrase. According to Truckenbrodt (1999), \*P-Phrase is a general constraint which can be used to render one or both of the alignment constraints inactive if they are ranked below it. It is a general constraint that seeks to avoid phonological phrases altogether. This constraint belongs to the \*STRUC family of constraints set up by Prince and Smolensky (1993) to ensure that structure is constructed minimally. Notably, the constraint \*P-Phrase is also attempted in Zerbian (2004) to account for major phonological phrasing in Xhosa and his account will be discussed with some detail later in this chapter<sup>160</sup>.

3- \*P-Phrase:

Avoid p-phrases altogether (Truckenbrodt, 1999)

<sup>159</sup> For more details see Truckenbrodt (1999).

<sup>160</sup> One more constraint used within Truckenbrodt (1999) is NONRECURSIVITY which punishes recursive structure. It is used as a gradient constraint and it helps him to account for surface phonological phrasing in Kimatuumbi.

- NONRECURSIVITY (NONREC)

Any two p-phrases that are not disjoint in extension are identical in extension (p. 240).

In addition to the two alignment constraints defined above, a new interface condition is introduced in Truckenbrodt (1995, 1999) and it is called Wrap-XP demanding that (lexical) XPs may not be split up into two or more phonological phrases. This constraint helps Truckenbrodt to account for major phonological phrasing in languages as Chichewa, Tohono O'odham and the domains of PTI in Kimatuumbi where the verb and two objects are mapped together onto a single  $\phi$  (i.e. (VOO) $\phi$ ). Within Truckenbrodt (1995, 2007), the Align-XP and Wrap-XP interface constraints, assumed to account for variations in phrasing at the MaP level, are defined as *violable and ranked constraints*, following Prince and Smolensky (1993).

#### 4- Wrap-XP:

Each XP is contained in a phonological phrase (Truckenbrodt, 1999, p. 228).

To the best of my knowledge, these are all the constraints employed by all end-based versions to account for variations in the formation of (major) phonological phrases cross-linguistically, leaving aside variations resulting from phonological effects. Thus, the mission now is to show how the new theory of MSO can predict (map) the domains covered by the above mentioned constraints. Actually, and as it has been indicated in the previous chapter, Align-XP,L/R and Wrap-XP can be attained within a spell-out-based account by assuming them to be instructions or parameters stored in phase heads regulating the p-phrasing of their domains. However, and since we are assuming the new syntactic assumptions of bare phrase structure, the alignment and wrap constraints cannot be maintained in their end-based forms due to their making use of notions as lexical projections and the notion of directionality (i.e., left/right edge) among others. In the following, I will attempt to show that the effects attained by the end-based constraints can still be maintained within the theory of MSO by recasting the minimalist spell-out parameters defined in the previous chapter as interface constraints.

#### 5.4.2.1.1 Spell-out Constraints on the $v^*P$ Phase

Concentrating on the  $v^*P$  phase, and assuming a di-transitive structure  $V \ X P_1 \ X P_2$ , two sets of constraints will be defined below: One set in relation to partial spell-out on the  $v^*P$  phase and another in relation to full spell-out on this phase. I assume below two constraints of partial spell-out on the  $v^*P$  phase which have the same effects the two align constraints (within the end-based) have on VP, and I assume one constraint of full spell-out on the  $v^*P$  phase whose effect amounts to that of Wrap-XP on VP<sup>161</sup>.

I do assume below a general condition which can account for partiality in phrasing within the  $v^*P$  domain and which can then be decoded into two spell-out-based constraints<sup>162</sup> which are nothing but the counterparts of the two features triggering partial spell-out on the  $v^*P$  phase discussed in the previous chapter.

##### **- Condition a:**

In languages with partial spell-out on the  $v^*P$  phase, two situations can be differentiated namely either the verb and each of its complements are defined as separate phonological domains or that the verb and its first (highest) complement will be defined onto a single domain while the second (lower) complement will be defined onto a separate domain.

Two partial spell-out constraints can be defined and formulated as follows:

###### *1. $v^*$ 's Partial Spell-out (maximum )constraint: $v^* \ Part_{(Max)}$*

Define the spell-out domain of a phase head  $v^*$  onto two separate  $\phi$ s: one including the verb ( $V-v^*$  or  $V-v^*-T$ ) and its first complement, and another including the second (lower) complement<sup>163</sup>.

The constraint  $v^* \ Part_{(Max)}$  can be sub-divided into two separate constraints :

- i.  $(V \ C_1)\phi$ : Define the verb and its first complement together onto a single domain.
- ii.  $(C_2)\phi$ : Define the verb's second complement as a separate domain.

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<sup>161</sup> Worth mentioning is that the end-based constraints are built on old syntactic assumptions that do not assume the verb movement.

<sup>162</sup> These two constraints are but the exponents of the two (end-based) alignment constraints mentioned earlier in this chapter.

<sup>163</sup> This results in phrasing the domain of a phase head  $v^*$  in ways as that predicted by Align-XP,R.

2.  $v^*$ 's Partial Spell-out (minimum) constraint:  $v^* \text{ Part}_{(\text{Min})}$

Define every prosodic word within the  $v^*$  domain onto a separate domain<sup>164</sup>.

The general constraint  $v^* \text{ Part}_{(\text{Min})}$  can be sub-divided into three separate constraints :

- i.  $(V)\phi$ : Define the verb as a separate domain
- ii.  $(C_1)\phi$ : Define the verb's first complement as a separate domain.
- iii.  $(C_2)\phi$ : Define the verb's second complement as a separate domain

However, and before going on to handle full spell-out on the  $v^*P$  phase, I will attempt here to simplify the OT grammar for partiality of spell-out on the  $v^*P$  phase. I will here assume a constraint  $(\text{Complex})\phi$  which entails that in a structure  $V \text{ XP}_1 \text{ XP}_2$ , full XPs can be defined onto their own domains to the exclusion of any other material/s. This constraint applies within the  $v^*P$  phase and results in the separate phrasing of complements in all the three cases above. However, it will be shown later that this constraint will be developed onto a general constraint that will account not only for the separate phrasing of the verb's complements within the  $v^*P$  phase but even for the separate phrasing of subjects and adjuncts as well. In this way,  $v^* \text{ Part}_{(\text{Max})}$  will be read as  $(VC_1)\phi$  and  $v^* \text{ Part}_{(\text{Min})}$  will be intended to mean  $(V)\phi$ . Thus, and instead of having 5 constraints, we end up with only three constraints: Two constraints expressing partiality of phrasing on the  $v^*P$  phase and one general constraint:

- i.  $v^* \text{ Part}_{(\text{Max})}$  or  $(V C_1)\phi$  constraint: Define the verb and its first complement together onto a single<sup>165</sup>  $\phi$

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<sup>164</sup> This results in phrasing the domain of a phase head  $v^*$  in ways as that predicted by Align-XP,L. I, here, assume that Align-XP,L can apply to right-branching languages. Actually, Truckenbrodt (1995) indicates that although in right –branching structures, Align-XP, R is supposed to be the relevant constraint, while in left –branching structures, it is Align-XP, L that is assumed to be in effect, this is not universal but rather a *markedness tendency*.

<sup>165</sup> I assume here that the term *single* and the term *separate* entail the same thing. Accordingly, a constraint is violated if a candidate does not include the *exact* element/s defined by its definition (i.e., not more and not less). However, one can perhaps differentiate between the term *single* and the term *separate* and as follows.

- a. *Separate domain*: when elements are defined into a separate domain this means the domain has to include the exact element/s (not more and not less).
- b. *Single domain*: when elements are defined into a single domain, this can have two interpretations:
  - i. *Single domain* can be taken to mean the same thing as *separate domain* namely *exact*, and this is the line of thinking I follow in this dissertation.

- ii.  $v^* Part_{(Min)}$  or  $(V)\phi$ : Define the verb as a separate  $\phi$
- iii.  $(ComplexCompnt)\phi$ : Define the verb's phrasal complements<sup>166</sup> (within the spell-out domain of  $v^*$ ) onto their own separate  $\phi$ s (to the exclusion of any other material).

On the other hand, the domain of a phase head  $v^*$  (verb + two complements and other elements) can be spelled-out at once and wrapped onto a single domain, and the effect of such spell-out amounts to the effect of Wrap-XP within the end-based. Thus, and on a par with the general partial spell-out condition a above, I define below a full spell-out condition b.

**- Condition b:**

In languages with full spell-out on the  $v^*P$  phase, the verb and its two complements are defined as a single phonological domain ( $\phi$ ).

*3.  $v^*$ 's Full Spell-out constraint :  $v^*_{Full}$ <sup>167</sup>*

This constraint is the counterpart of  $v$ 's wrapping feature triggering full spell-out on the  $v^*P$  phase discussed in Chapter 4. This constraint entails that the whole spell-out domain

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- ii. It can however mean *not less*. Hence, a constraint is violated only if a candidate does not include the elements specified by its definition. A constraint is not violated if a candidate includes other elements as well.

If you check all the tableaus used in this chapter and the following chapter, you will find that we can use the second interpretation of *single* domain, namely not less, in relation to the constraints  $v^*Part_{(Max)}$ , and  $v^*Full$  (and even  $v^*Part_{(Min)}$ ), and we can still predict the optimal candidate since the constraint  $(Complex)\phi$  can rule out all unoptimal candidates. The constraint  $(Complex)\phi$ , however, has as its definition indicates one meaning only namely *separate/exact*.

- $(ComplexCompnt)\phi$ : Define the verb's phrasal complements (within the spell-out domain of  $v^*$ ) onto their own **separate**  $\phi$ s (to the exclusion of any other material).

<sup>166</sup> Here, the constraint is defined in relation to  $v$ 's complements, but later on I will give it a more general form.

<sup>167</sup> In the case of mono-transitive sentences, the prediction of this constraint is that the verb and its complement will be mapped together onto a single  $\phi$  and thus it can be read as  $(V C1)\phi$ . Thus,  $v^*Full$  and  $v^*Part_{(Max)}$  predict the same phrasing in mono-transitive sentences namely  $(VO)\phi$ , though their predictions are different in di-transitive sentences as  $v^*Full$  predicts the phrasing  $(VOO)\phi$ , while  $v^*Part_{(Max)}$  predicts the phrasing  $(VO)\phi(O)\phi$ . The assumption here is the same as that of Align-XP,R and Wrap-XP where both predict that the same phrasing pattern in mono-transitive sentences namely  $(VO)\phi$ , though they differ in defining the phonological domains in di-transitive sentences as Align-XP,R predicts the phrasing  $(VO)\phi(O)\phi$  while Wrap-XP predicts the phrasing  $(VOO)\phi$ .

of a phase head  $v^*$  (i.e.,  $V-v^*$  + its complements + along with other elements inside the domain) is defined (mapped) onto a single  $\phi$  domain<sup>168</sup>.

- i.  $v^*_{Full}$ : Define (wrap) the whole domain of a phase head  $v^*$  onto a single  $\phi$ .

#### *5.4.2.1.2 Spell-out Constraints on the CP Phase*

To account for the tendency in some languages to define a domain as large as the clause as still a major phonological phrase domain (i.e.  $(SVO)\phi$ ,  $(SVOO)\phi$ ), rather than an intonational phrase one, I do assume a new interface constraint  $C_{Full}$ . The effect of this constraint resembles, though does not equal, that of  $*P\text{-Phrase}$  used within the end-based. However, this constraint is not intended to replace  $*P\text{-Phrase}$ . I will still assume and use  $*P\text{-Phrase}$  as a general constraint militating against forming phonological phrases altogether. The new constraint is different from  $*P\text{-Phrase}$  in three ways.

- 1- The new constraint is interface constraint, while  $*P\text{-Phrase}$  is a general constraint.
- 2- Unlike  $*P\text{-Phrase}$ , the new constraint is non-gradient (non-gradedness of a constraint means it can only be violated once). It is a good candidate to account for p-phrasing in languages as Xhosa as it will be shown later in this chapter.
- 3-  $*P\text{-Phrase}$  entails that phonological phrases should be avoided altogether and thus the phrasing  $(SVOO)\phi$  still incurs one violation. On the other hand, the constraint  $C_{Full}$  entails wrapping the whole domain of C onto a single domain and hence the phrasing  $(SVOO)\phi$  incurs no violation.

#### **- Condition a:**

In languages with full spell-out on the CP phase, the domain IP<sup>169</sup> (or what remains of it) is defined as a single phonological domain ( $\phi$ ).

Accordingly, let us assume a di-transitive sentence SVOO. If no spell-out is performed on the  $v^*P$  phase and spell-out is delayed via PIC2 till C is merged, then C's wrapping instruction will result in the whole domain of C being defined as a single domain  $\phi$  and the resulting phrasing is  $(SVOO)\phi$ . This pattern of p-phrasing exists in symmetrical

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<sup>168</sup> This results in phrasing the domain of a phase head  $v^*$  in ways as that predicted by Wrap-XP.

<sup>169</sup> It can also be the case that it is perhaps C+IP that undergo spell-out together.

Bantu languages (Seidl, 2001) of which Xhosa is one and which will be dwelled on later in this chapter. Thus, I formulate this tendency as a constraint which is nothing but the counterpart of C's strong wrapping feature.

i. C's Full Spell-out constraint1:  $C_{Full}$  [or  $(S V C_1 C_2)\phi$  constraint]

Define (wrap) the domain of a phase head C (i.e., IP) onto a single  $\phi$  (or a prosodic phrase)<sup>170</sup>.

However, we can distinguish another type of domain that may result from C's wrapping instruction and hence a different constraint. Accordingly, for an SVOO sentence, if spell-out is performed on the  $v^*P$  phase via PIC1 and the lower complement is defined as a separate domain, then when C with wrapping instruction is merged, C's wrapping instruction will result in that whatever remains in the domain of C being defined as a single domain and the resulting phrasing is  $(S V C_1)\phi (C_2)\phi$ . This type of p-phrasing is the one assumed in Seidl (2001) for asymmetric Bantu languages and it will be shown in Chapter 6 that this type of phrasing is also found in San'ani, a Yemeni dialect spoken in the north of Yemen. The separate phrasing of the second argument, and as it has been discussed before while dwelling on the constraints on the  $v^*P$  phase, can be accounted for by the constraint  $(Complex_{Compt})\phi$ . Thus, I will formulate here the resulting phrasing from C's wrapping instruction as a constraint and I will call it  $C_{Full @ or} (S V C_1)\phi$  constraint.

ii. C's Full Spell-out constraint 2:  $C_{Full @}$  [or  $(S V C_1)\phi$ ]:

Define (wrap) the domain of a phase head C (i.e., what remains of IP) onto a single  $\phi$ .

#### 5.4.2.1.3 Subject and Adjunct Constraints

In this part, I am going to develop a general constraint  $(Complex)\phi$  which will account for the separate phrasing of some structure constituents. However, and before I go on to give it its general shape, I would like to give it some specific forms by defining it in

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<sup>170</sup> Although this constraint is used here to account for the formation of major phonological phrases, it can perhaps be also used to account for intonational phrase formation in some languages.

relation to different sentence constituents that tend to phrase separately. One of these specific forms has already been defined in relation to the verb's complements, entailing that the verb's (full DP) complements must be phrased separately, and I repeat it below.

i. *(ComplexCompnt)ϕ*

Define the verb's phrasal complements (within the spell-out domain of  $v^*$ ) onto their own separate  $\phi$ s (to the exclusion of any other material).

Other specific forms of this constraint can be defined in relation to (full DP) subjects, and adjuncts which also tend to phrase separately. Below I discuss the p-phrasing of both subjects and adjuncts with some detail.

### 1 -Phrasing of subjects

I assume here a constraint that can account for the separate phrasing of subjects and this constraint can be read as subjects (not pronoun subjects) form their separate phonological phrases. Actually, if one assumes the new notion assumed in this dissertation namely that the fate (spell-out and hence p-phrasing) of the phase head ( $V+v^*$  or  $V-v^*-T$ ) and its complement is decided within the  $v^*P$  phase, then the assumption that subjects<sup>171</sup> have different situation (in spell-out and p-phrasing) from other elements falls naturally, as (full DP) subjects tend in majority of cases to be phrased separately.

The subject constraint is hence a consequence of the new assumed spell-out mechanism itself: If the phrasing of the phase head  $v^*$  ( $V+v^*$  or  $V-v^*-T$ ) and its complement is determined within the  $v^*P$  phase by the spell-out instruction/s of the phase head  $v^*$ <sup>172</sup>, then it is natural that the subject will have a different situation viz being phrased separately.

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<sup>171</sup> Here, I assume that the subject is spelled-out by the main derivation workspace of the clause (Contra Uriagereka, 1999).

<sup>172</sup> As it is indicated in the previous chapter, the phase head  $v^*$  (in the configurations  $V-v^*$ , or  $V-v^*-T$ ) belongs to the  $v^*P$  phase for spell-out purposes, however, whether it gets spelled-out in the  $v^*P$  phase or in the CP phase, this depends on the kind of spell-out instruction a phase head may include. If a phase head  $v^*$  includes the instruction to spell-out the verb and object together, then the verb ( $V-v^*$ , or  $V-v^*-T$ ) will be spelled-out within the  $v^*P$  phase (or the slided phase). If, on the other hand, a phase head  $v^*$  has the instructions to spell-out the verb and object separately, then, the object will undergo spell-out within the  $v^*P$  phase, while the verb ( $V-v^*$  or  $V-v^*-T$ ) will undergo spell-out onto a separate domain within the CP phase (via the spreading of the instructions of  $v^*$  onto the C level).

Moreover, the following are some of the (spell-out-based & GB-based) models supporting the fact that subjects have different situation from other elements and thus tend to be phrased separately

- Uriagereka's (1999) MSO model<sup>173</sup>: The fact that complex subjects (full DPs) form their own p-phrases is one of the main predictions within Uriagereka's MSO model (as complex subjects undergo early spell-out).
- Narita and Samuels' (2009) schema: Within this study, the prediction is that a phrasal subject is phonologically phrased separately.
- Ishihara (2007): The prediction here is that if the subject moves to Spec,TP, it will be phrased separately<sup>174</sup>.
- End-based (Truckenbrodt, 1995, 1999, 2007; Selkirk, 1995, 2000): The prediction here is that (lexical) maximal projections, in this case lexical XPs subjects<sup>175</sup>, form their own separate  $\phi$ s and this phrasing is predicted by Align-XP<sup>176</sup>.

Thus, I formulate below the observed tendency for (full DP) subjects to phrase separately as a constraint.

ii.  $(Complex\ Subj)\phi$ : Subject phrasing constraint

Subjects<sup>177</sup> (not pronoun subjects) form their own separate  $\phi$ s (to the exclusion of any other material).

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<sup>173</sup> For more details on the predictions of Uriagereka's (1999) MSO, see Sato (2009).

<sup>174</sup> However, if the subject stays within  $v^*P$ , it will be phrased together with other elements in  $v^*P$  onto a single domain.

<sup>175</sup> The end-based distinguishes between a full subject and a pronoun subject in that only a full subject is sensitive to the syntax-phonology mapping by Align-XP. According to Truckenbrodt (1999, 2007), though both full NPs and pronouns are syntactically DPs, pronouns head DPs with no complement ([shed] $DP$ ), whereas determiners head DPs with lexical NP complement ([theD [teachern] $NP$ ] $DP$ ). Thus, subject pronouns, being DPs, do not trigger  $\phi$  boundary as Align-XP applies only to lexical XPs, however, full subjects, though being DPs, still trigger a  $\phi$  boundary because it is the lexical NPs within the DPs that trigger the boundary rather than the DPs.

<sup>176</sup> Even within the parametric theory of Hale and Selkirk (1987), the prediction is that XP subjects will always form their own  $\phi$ s disregarding whether lexical government is relevant for a language or not.

a. Lexical government is relevant (i.e., boundaries after XPs that are not lexically governed)

1- lexical government is relevant + right alignment =  $NP_{sub}\phi\ VP\phi$   
2- lexical government is relevant + left alignment =  $\phi( NP_{sub} \phi( VP$

b. Lexical government is irrelevant (i.e., boundaries after each XP)

1- lexical government is irrelevant + right alignment =  $NP_{sub}\phi\ VP\phi$   
2- lexical government is irrelevant + left alignment =  $\phi( NP_{sub} \phi( VP$

<sup>177</sup> Full DPs

## B. Phrasing of adjuncts

Within many theories, adjuncts are assumed to form their own separate phonological domains. More specifically, within MSO models, adjuncts are spelled-out separately and thus form their own separate prosodic phrases.

- Uriagereka's (1999) MSO model: It predicts that complex adjuncts form independent prosodic domains from the structure to which they are adjoined.
- Ishihara (2007): Adjuncts and A'-moved materials are excluded from a spell-out domain (i.e., excluded from CP & v\*P)<sup>178</sup>.
- Narita and Samuels' (2009) schema: The prediction here is that a (phrasal) adjunct is phonologically phrased separately<sup>179</sup>.
- End-based account: Truckenbrodt (1995) generalizes the proposal by May (1985) and Chomsky (1986) regarding adjoined elements to the syntax-phonology mapping with the consequence that elements adjoined to XP are treated as if they do not belong to XP and thus end up phrased separately<sup>180</sup>. Moreover, Truckenbrodt (1995) indicates that the adjunct type that triggers  $\phi$  boundary at its edge (via Align-XP) is full XP (phrasal adjunct)<sup>181</sup>.

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<sup>178</sup> Within Ishihara's (2007) MSO-based mapping, the prediction is that adjuncts adjoined to a phase say v\*P are excluded from the spell-out domain of that phase "Phrases that are 'adjoined' to a phase (i.e., adjuncts and A'-moved phrases) are outside the SO domain of this phase" (Ishihara, 2007, p. 146), whereas adverbs adjoining not to a phase, say VP, will be included in the spell-out domain of that phase.

<sup>179</sup> However, they draw a distinction between TP-level adjuncts which undergo non-complement reduction and thus form their own separate phonological domains, and low VP-level adjuncts which do not constitute separate phonological phrases.

<sup>180</sup> Truckenbrodt (1995) puts it that "The consequence of the way in which Align-XP and Wrap-XP apply to an adjunction-structure is that the element adjoined to XP is phrased separately" (p. 147).

<sup>181</sup> Moreover, Truckenbrodt (1999) indicates that not all adjuncts trigger  $\phi$ -boundary via Align-XP as it is the case in languages as Xiamen Chinese. In footnote 5, Truckenbrodt (1999) puts it that "A class of adjunct (certain adnominal adjectives and VP adverbs) is exceptional to this algorithm...What is common to these cases is that the adjuncts in question do not introduce prosodic boundaries at their edges, as would be expected if they were full XPs. Clement (1978) and Selkirk and Tateishi (1991) both propose that these adjuncts fail to trigger boundary effects at their edges because they are syntactic heads, rather than syntactic phrases...Abney (1987) and Williams (1994) have argued on independent syntactic grounds that certain classes of adverbs and adjectives do not constitute XPs on their own" (pp. 222 - 223).

Thus, the prediction here is that adjuncts, just as subjects<sup>182</sup>, tend to form their own MaPs. Putting the above prediction regarding the p-phrasing of adjuncts into a constraint form, we end up with the following constraint:

iii.  $(Complex\ Adj)\phi$ : Adjunct phrasing constraint

Adjuncts form their own separate  $\phi$ s (to the exclusion of any other material).

As I indicated earlier, I will finally develop these 3 constraints into a more general constraint form. I call it  $(Complex)\phi$  and I formulate it below. This constraint is assumed to apply to phrases (not phases), more specifically it is defined in relation to: adjuncts, subjects and verb's complements. This constraint hence will help us to account for the separate phrasing of these 3 syntactic elements and the effects attained by this constraint resemble that of the Align constraints in the cases where they result in phrasing phrasal subjects, objects and adjuncts separately.

-  $(Complex)\phi$ :

Define (complex) phrases onto their own separate  $\phi$ s (to the exclusion of any other material).

As we will see later in this chapter, this constraint will be employed to account for the separate phrasing of: 1-Subjects (not pronoun subjects), 2-Adjuncts, 3- the verb's complements and 4- even p-phrasing patterns emerging under (the effect of) narrow focus in languages as Chichewa and Xhosa.

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<sup>182</sup> However, the other prediction within Uriagereka (1999) and Narita & Samuels (2009) and Truckenbrodt (1999, 2007) is that subject pronouns (simplex subjects) as well as simplex adjunct do not form their own phonological phrases but are rather included in neighboring phonological phrases. One can thus formulate another constraint that bans against the phrasing of subject pronouns and simplex adjuncts onto separate phrases.

-  $(*Simplex)\phi$

Subject pronouns and adverbs do not form their separate phonological phrases.

However, and for ease of use, I will not include the constraint  $(*Simplex)\phi$  since its effect can still be maintained without the need for a constraint. To illustrate, let us consider the case of simplex subjects. Considering subjects, the constraint  $(Complex\ Subj)\phi$  is not violated when a subject pronoun is phrased together with neighbouring material as it demands that only complex (i.e. full DP subjects) should form their own separate phonological domains but it says nothing about simplex ones.

**Before to conclude this section, I want to indicate the following:**

- ✓ I assume that the spell-out-based constraints defined above are all that we need to account for phonological variations in the formation of  $\phi$  cross-linguistically.
- ✓ All the p-phrasing possibilities predicted by the end-based constraints can still be predicted by the new constraints.

#### A. *The effects of Align-XP,R and Align-XP,L*

The effects of *Align-XP,R* and *Align-XP,L* can be now attained by the following 3 constraints:

- i.  $v^* \text{Part}_{(\text{Max})}$  and  $v^* \text{Part}_{(\text{Min})}$ : Whether the verb is to be phrased separately or along with its first complement depends on whether  $v^* \text{Part}_{(\text{Min})}$  or  $v^* \text{Part}_{(\text{Max})}$  is in effect. If  $v^* \text{Part}_{(\text{Max})}$  is in effect, then the verb will be phrased together with its first complement, however, if  $v^* \text{Part}_{(\text{Min})}$  is the one in effect, then the verb will be phrased separately (while its first complement will be defined onto a separate domain by the constraint  $(\text{Complex})\phi$ ).
- ii.  $(\text{Complex})\phi$ : The separate phrasing of subjects, adjuncts and complement(s) can be accounted for by the constraint  $(\text{Complex})\phi$ .

#### B. *The effect of Wrap-XP*

- i.  $v^* \text{Full}$ : The effect of Wrap-XP can be now attained by the constraint  $v^* \text{Full}$

✓ *Two new full interface constraint*

Two new interface constraints are proposed which have no equivalents within the end-based.

- i.  $C_{\text{Full}}$  [or  $(S V C_1 C_2)\phi$  constraint]:

Define (wrap) the whole domain of a phase head  $C$  (i.e., whole IP) onto a single  $\phi$  (or a prosodic phrase).

- ii.  $C_{\text{Full} @}$  [or  $(S V C_1)\phi$ ]:

Define (wrap) the domain of a phase head  $C$  (i.e., what remains of IP) onto a single  $\phi$ .

#### 5.4.2.2 The New Constraint-Based OT Grammar: A Sketch

Having established the new interface constraints, this part will sketch the new OT grammar summarizing the constraints to be used. The new constraint-based OT grammar, accordingly, and in line with the end-based one, consists of the following two sets:

##### A - The new (spell-out-based) faithfulness constraints

1.  $v^* \text{Part}_{(\text{Max})} \text{ or } (V C_1)\phi$  constraint:

Define the verb and its first complement together onto a single  $\phi$

(This constraint is violated if the verb and its first complement are not defined together onto a separate  $\phi$ )

2.  $v^* \text{Part}_{(\text{Min})} \text{ or } (V)\phi$  constraint: Define the verb as a separate  $\phi$

(This constraint is violated if the verb is not defined onto a separate  $\phi$ )

3.  $v^* \text{Full} \text{ or } (V C_1 C_2)\phi$  constraint

Two forms of the constraint can be interchangeably used. The general form of the constraint is  $v^* \text{Full}$  and can be read as:

- $v^* \text{Full}$ : Define (wrap) the whole domain of a phase head  $v^*$  onto a single  $\phi$ .

(This general form of the constraint can account not only for the wrapping of the verb together with its two complements but even for the wrapping of other elements within the spell-out domain of  $v^*$ ).

The specific form of this constraint is  $(V C_1 C_2)\phi$  and can be defined as:

- $(V C_1 C_2)$

Define (wrap) the verb and its two complements onto a single  $\phi$ .

(This constraint is violated if the verb and its two complements are not defined together onto a separate domain.)

4.  $C_{\text{Full}} \text{ [or } (S V C_1 C_2)\phi \text{ constraint]}$

Define (wrap) the domain of a phase head  $C$  (i.e., IP) onto a single  $\phi$  (or prosodic phrase).

5.  $C_{\text{Full}} @ \text{ [or } (S V C_1)\phi \text{]}$

Define (wrap) the domain of a phase head  $C$  (i.e., what remains of it) onto a single  $\phi$ <sup>183</sup>.

6.  $(\text{Complex})\phi$

Define (complex) phrases onto their own separate  $\phi$ s (to the exclusion of any other material).

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<sup>183</sup> This entails defining the subject, verb and its first (highest) complement within a single domain  $\phi$ .

## B- Markedness Constraints

In addition to the set of interface constraints mentioned above, I do also assume the role markedness constraints in (re-)shaping phonological domains. Best-known markedness constraints employed by the end-based are those defined within Ghini (1993) and Selkirk (2000) and which are discussed earlier in Chapter 2 and repeated below.

- *Phonological constraints on phrasing: (Selkirk, 2000)*

- i. Binary Maximum (MaP): A major phrase may consist of at most two minor/accentsual phrases.
- ii. Binary Minimum (MaP): A major phrase must consist of at least two minor/ accentsual phrases.
- iii. Binary (MaP): A major phrase consists of just two minor/ accentsual phrases (p. 244)

- *Phonological constraints on phrasing: (Ghini, 1993)*

- i. Uniformity: A constraint that entails that a string is ideally parsed into same length units (Thus, it can be understood as a weight balance constraint)
- ii. Average weight: A constraint that prefers phonological phrases consisting of two phonological words at an average rate of speech.
- iii. Increasing units: A constraint that disfavors a p-phrasing that groups a decreasing number of clitic-groups at the end of a sequence.

### 5.4.2.3 The New (Spell-out-Based) OT Constraints in Practice

#### 5.4.2.3 .1 Chichewa: (S)φ (VO)φ, (S)φ (VOO)φ

##### 5.4.2.3.1.1 Previous (End-Based) Account: (Truckenbrodt, 1995; Kager & Zonneveld, 1999)

###### a. P-phrasing under broad focus: (VO)φ, (VOO)φ

The phrasing pattern in Chichewa under broad focus is one where the verb and other elements in VP are phrased together (Truckenbrodt, 1995; Kager & Zonneveld, 1999).

Example (1)

(anaményá nyumbá ndí mwáála)φ

he-hit the-house with-a-rock (Truckenbrodt, 1995, p. 103)

Kager and Zonneveld (1999), following Truckenbrodt (1995), indicates that this pattern of phrasing can be accounted for by the constraints ranking system: Wrap-XP, Non-Rec >> Align-XP,R. According to Kager and Zonneveld (1999), the tableau for sentence 1 above would be something as the following.

Tableau (1)

[V YP ZP] VP	Wrap-XP	Non-Rec	Align-XP, R
a.( V YP ZP)φ			*
b.( V YP)φ (ZP)φ	*!		
c.((V YP)φ (ZP)φ		*!	

Kager and Zonneveld (1999)

b. P-phrasing under narrow focus: Focused verb with two complements: (V)φ (YP)φ (ZP)φ

Notably, in Chichewa, and as in many other languages, the focused element influences phonological phrasing in that the focused element introduces a φ-boundary after it. To account for this phrasing pattern, Truckenbrodt (1995) introduces a new constraint, and indicates that ranking this constraint the highest can account for the boundary after the focused element. The following is the constraint assumed to account for the separate phrasing of the focused element as defined in Kager and Zonneveld (1999) after Truckenbrodt (1995).

- *Align-Foc*

Align (Foc, R: φ, R): Each focused constituent is followed by a φ-boundary

However, in the case where a verb with two complements is focused, a boundary occurs not only after the focused verb but even after the first complement. The following is the same sentence mentioned above but with the verb getting focused. As the tableau below makes it clear, the right candidate (V)φ (YP)φ (ZP)φ with a boundary after the first complement is still predictable and this is assumed within Kager and Zonneveld (1999) to be the emergence-of-the-unmarked effect.

## Example (2)

(anaményá)φ (nyumbá)φ (ndí mwáála)φ (Truckenbrodt, 1995, p. 133)

he-hit the-house with-a-rock

**Tableau (2)**

[ V YP ZP] VP	<i>Align-Foc</i>	<i>Wrap-XP</i>	<i>Non-Rec</i>	<i>Align-XP, R</i>
a.( V YP ZP)φ	*!			*
b.( V)φ (YP ZP )φ		*		*!
c.(V)φ (YP)φ (ZP)φ		*		

Kager and Zonneveld (1999)

## 5.4.2.3.1.2 New Account

I am going here to develop a new OT account for the observed phonological phrasing pattern(s) in Chichewa. The OT account discussed above uses end-based constraints built on X-bar syntax. However, the new OT account proposed here to account for the Chichewa sentences mentioned above employs constraints built on the current approach of MSO.

Before going on to account for the same data discussed earlier within the previous OT account above, I want first to define the OT constraints I am going to use and to give them some spell-out basis. Doing so, I just intend to draw a connection between the assumed spell-out mechanism developed earlier in this dissertation and the new OT account developed in this chapter. Otherwise, there is no real need to draw such a tie between the spell-out process and the OT constraints. Generally speaking, OT account is a general account that builds on nothing but (OT) constraints.

Basic syntactic, phonological and interface facts about Chichewa:

1- Phrasing pattern under broad focus: Chichewa is a language with the phrasing type (VOO)φ (Seidl, 2001; Truckenbrodt, 1995; Kager & Zonneveld, 1999). As it is shown in the previous account, the phrasing pattern (VOO)φ in Chichewa is accounted for by the dominance of the constraint Wrap-XP (Truckenbrodt, 1995).

2-Chichewa is a language with V-to-T movement<sup>184</sup>(Dobashi, 2004).

3-Narrow focus: It leads to insertion of a boundary to the right of the focused element and this separate phrasing of the focused element is accounted for by the undominated constraint Align-Foc.

- *Align-Foc*

Align (Foc, R :  $\phi$ , R): Each focused constituent is followed by a  $\phi$ -boundary

4-When a verb with two complements is focused, an extra boundary emerges between the two complements which, unlike the boundary after the focused verb, is not predicted by focus viz by Align-Foc.

*The above-mentioned facts and their implications can be read within the new analysis as follows:*

1- P-phrasing is (VOO) $\phi$  --->

- I.  $v^*$  has wrapping instruction to wrap its whole domain onto a single domain  $\phi$ . Hence the constraint  $v^*_{Full}$  is in effect.
- II. For  $v^*_{Full}$  spell-out to occur, the verb must be in its landing site. Since Chichewa is a V-to-T language, spell-out will be late via PIC2. When C is merged, spell-out on the lower (slided) phase is not ignored viz  $v^*$ 's instruction is not overridden by any wrapping instruction of C and this can be explained in OT by highly ranking the constraint  $v^*_{Full}$ .

2- Narrow focus: the constraint *Align- Foc* is in effect entailing a  $\phi$ -boundary to the right of a focused element -->

Since directionality is not assumed within the spell-out-counterpart of the OT account developed in this chapter, I replace the constraint *Align- Foc* above with the following constraint.

- After-Focused: A focused constituent introduces a  $\phi$ -boundary after it (between it and following elements).
- 3- When a verb with two complements is focused, an extra boundary emerges between the two objects-->

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<sup>184</sup> Notably, Seidl (2001) defines Chichewa as an asymmetric language with verb movement only to Aspect head.

I assume that there is a tendency in Chichewa to phrase (complex) phrases separately<sup>185</sup> and this can be explained in OT by the constraint (*Complex*) $\emptyset$ . This constraint can also account for the separate phrasing of (phrasal) subjects in Chichewa. Notably, the subject will be spelled-out alone in the domain of C.

*Thus, I assume that the constraints system for Chichewa can consist of the following constraints:*

- i. *v\**<sub>Full</sub>: Define the whole domain of a phase head *v\** onto a single  $\emptyset$
- ii. (*Complex*) $\emptyset$ : Define (complex) phrases onto their own separate  $\emptyset$ s (to the exclusion of any other material).
- iii. *After-Focused*: A focused constituent introduces a  $\emptyset$ -boundary after it. (This constraint is in effect in the case where there is a focused element).

In the following, I present a new account for the same data previously accounted for within the end-based.

#### A: The sentence under broad focus:

Example (3)

(anaményá nyumbá ndí mwáála) $\emptyset$   
he-hit the-house with-a-rock

#### Tableau (3)

[CP C [ <sub>TP</sub> V- <sub>v</sub> -T [ <sub>vP</sub> < <sub>v</sub> > [ <sub>VP</sub> < <sub>V</sub> > YP ZP]]]]	<i>v*</i> <sub>Full</sub>	<i>Non-Rec</i>	( <i>Complex</i> ) $\emptyset$
a.( V YP ZP) $\emptyset$			**
b.( V YP) $\emptyset$ (ZP) $\emptyset$	*		*
c.(V) $\emptyset$ (YP) $\emptyset$ (ZP) $\emptyset$	*		

---

<sup>185</sup> This tendency is perhaps obscured in relation to the *v\**P elements in the case of the phrasing under wide focus due to the dominance of the constraint *v\**Full, but it shows up in narrow focus due to the high-ranking of the constraint *After-Focused*. This is perhaps what Kager and Zonneveld (1999) refers to, in the first account discussed above, as the emergence-of-the-unmarked effect, though they were talking about the low-ranked constraint Align-XP,R, whose effect in this case can be predicted within my account by the constraint (*Complex*) $\emptyset$ . Notably, though the effect of the constraint (*Complex*) $\emptyset$  is obscured under broad focus in relation to the *v\**P elements due to dominance of the constraint *v\**Full, the effect of the constraint (*Complex*) $\emptyset$  can still be observed in relation to elements outside the *v\**P domain, mainly the subject which is phrased separately.

## B: The sentence under narrow focus

Example (4)

(anaményá)φ (nyumbá)φ ( ndí mwáála)φ  
he-hit the-house with-a-rock

### Tableau (4)

$[CP \ C \ [TP \ V-v-T \ [vP <v> \ [VP <V> \ YP \ ZP]]]]$	<i>After-Focused</i>	$V^*_{Full}$	<i>Non-Rec</i>	<i>(Complex) φ</i>
a.(V)φ (YP)φ (ZP)φ		*		
b.( V)φ (YP ZP )φ		*		**
c.( V YP ZP)φ	*			**

As the two tableaus above show, the new constraints are able to predict the right candidate both under narrow and wide focus. Thus, it seems that the newly proposed OT constraints for Chichewa (and their ranking) are perhaps qualified enough to replace their antecedent end-based OT constraints.

#### 5.4.2.3.2 Chi Mwi:ni : (S)φ (VO)φ , (S)φ (VO)φ (O)φ

##### 5.4.2.3.2.1 Previous (End-Based) Account: (Truckenbrodt, 1995)

a. *P-phrasing under broad focus:* (S)φ (VO)φ & (S)φ (VO)φ (O)φ

Within Truckenbrodt (1995), it is indicated that in Chi Mwi:ni a VP is mapped under broad focus onto two separate phonological domains or φs, one for the verb plus its first complement, and another for the second complement. This phrasing pattern is accounted for by Truckenbrodt (1995) using the constraints *Align-XP*, *R*, *Non-Rec* and *Wrap-XP* and the following ranking: *Align-XP*, *R*, *Non-Rec* >> *Wrap-XP*. In the following, I present two different sentences from Truckenbrodt (1995) and their tableaus.

Example (5): NP V NP structure type

( Ja:ma)φ (ingile mtana:ni )φ

( NP )φ ( V NP )φ

Jama entered the room (p. 52)

Example (6): V NP NP structure type

(panzize cho:mbo) $\phi$  (mwa:la) $\phi$

( V            NP ) $\phi$  (    NP   ) $\phi$

He ran the vessel onto the rock (p. 100)

The tableaus for the two preceding sentences would be something like the following:

**Tableau (5) for example (5)**

[ XP [V YP] VP ] IP	Align-XP, R	Non-Rec	Wrap-XP
☞ a.( XP) $\phi$ (V YP ) $\phi$			
b.( XP) $\phi$ (V) $\phi$ (YP ) $\phi$			*
c. ( XP V) $\phi$ (YP) $\phi$	*		*

**Tableau (6) for example (6)**

[ V YP ZP ] VP	Align-XP, R	Non-Rec	Wrap-XP
☞ a.( V YP) $\phi$ (ZP) $\phi$			*
b.( V YP ZP) $\phi$	*		

#### 5.4.2.3.2.2 New Account

I intend here to develop a constraint system for Chi Mwi:ni that will be based on some spell-out functions.

Basic syntactic, phonological and interface facts about Chi Mwi:ni are :

- 1- Chi Mwi:ni is a language with the p-phrasing type (S) $\phi$  (VO) $\phi$  (O) $\phi$  (Truckenbrodt, 1995; Kager & Zonneveld, 1999). As it is stated in the previous account, the phrasing pattern (VO) $\phi$  (O) $\phi$  in Chi Mwi:ni is accounted for by the dominance of the constraint Align-XP,R (Truckenbrodt, 1995).
- 2- Chi Mwi:ni is an asymmetric language and the verb moves only to an Aspect head<sup>186</sup> (Seidl 2001).

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<sup>186</sup> Unlike Chichewa, verb movement is here of less importance, if any. This is due to the fact that only the lower complement will undergo spell-out within the v\*P phase. The verb and its first complement will not get spelled-out until the second strong phase level C is merged.

*The above-mentioned facts and their implications can be read within the new account as follows:*

- 1- Phrasing pattern on the  $v^*P$  phase is  $(VO)\phi (O)\phi \rightarrow v^*$  has instructions to define its domain onto two separate phonological domains ( $\phi$ s). Hence the constraint  $v^* Part_{(Max)}$  constraint is in effect.

-  $v^* Part_{(Max)}$ :

Define the spell-out domain of a phase head  $v^*$  onto two separate  $\phi$ s: one including the verb (V- $v^*$  or V- $v^*-T$ ) and its first complement, and another including the second (lower) complement

Hence, when  $v^*$  merges and discharges its instructions, spell-out happens via PIC1 and partially fulfills the spell-out instructions of  $v^*$  as the lower argument gets defined as separate domain within spell-out on the  $v^*P$  phase. The other instruction of  $v^*$  namely to define the verb and its highest complement onto a separate domain  $\phi$  will be carried over to the next strong phase level C. When C merges, spell-out happens defining the verb and its highest complement onto a separate domain  $\phi$ . Thus, the  $v$ 's instruction to define the verb and its highest complement onto a separate domain does not seem to be overridden by any instruction of C<sup>187</sup> and this can be explained in OT by the constraint  $v^* Part_{(Max)}$  being the highest-ranking constraint. As for the subject, it will be separately spelled-out when spell-out finally happens to the root.

*Thus, I assume that the constraint system for Chi Mwi:ni will include the following constraints:*

- i.  $v^* Part_{(Max)}$ <sup>188</sup> or  $(V C_1)\phi$  constraint: Define the verb and its first complement together onto a single  $\phi$ .

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<sup>187</sup> That is to say, C in Chi Mwi:ni has no (wrapping) instruction.

<sup>188</sup> As it is indicated earlier in this chapter, this general constraint  $v^*Part_{(Max)}$  is basically read as two separate constraints:

- i.  $(V C_1)\phi$ : Define the verb and its highest complement together onto a single  $\phi$ .
- ii.  $(C_2)\phi$ : Define the verb's lower complement as a separate domain.

However, and for the sake of obtaining an easy OT grammar, I assumed that the constraint  $v^*Part_{(Max)}$  can be read as  $(V C_1)\phi$ . As for the constraint  $(C_2)\phi$ , it will not be included in Chi Mwi:ni's OT grammar for easiness purposes. The separate phrasing of the lower complement XP<sub>2</sub> can still be maintained via the constraint  $(Complex)\phi$ . As the tableaus below show, using the constraint  $(Complex)\phi$  helps us in attaining the separate phrasing of the lower complement. However, the constraint  $(Complex)\phi$  has an upper hand

ii. (*Complex*) $\phi$ :

Define (complex) phrases onto their own separate  $\phi$ s (to the exclusion of any other material).

This constraint will account for the separate phrasing of both (phrasal) subjects and the lower complements in Chi Mwi:ni.

In the following, I present new OT account for the phrasing pattern(s) of the two sentences discussed above within the end-based account (Truckenbrodt, 1995) for Chi Mwi:ni.

Example (7) (Ja:a:ma)  $\phi$  (ingile mtana:ni)  $\phi$

**Tableau (7)**

[CP C [TP XP T [ <sub>vP</sub> <XP> <sub>v</sub> [VP V YP]]]]	<i>v</i> * <i>Part</i> <sub>(Max)</sub>	<i>Non-Rec</i>	( <i>Complex</i> ) $\phi$
☞ a. (XP) $\phi$ (V YP) $\phi$			*
b. (XP V) $\phi$ (YP) $\phi$	*		*
c. (XP) $\phi$ (V) $\phi$ (YP) $\phi$	*		
d. (XP V YP) $\phi$	*		**

Example (8) (panzie cho:mbo)  $\phi$  (mwa:la)  $\phi$

**Tableau (8)**

[ <sub>vP</sub> <i>v</i> [VP V YP ZP]]]	<i>v</i> * <i>Part</i> <sub>(Max)</sub>	<i>Non-Rec</i>	( <i>Complex</i> ) $\phi$
☞ a.( V YP) $\phi$ (ZP) $\phi$			*
b.( V YP ZP ) $\phi$	*		**
c.(V) $\phi$ (YP) $\phi$ (ZP) $\phi$	*		

To test the constraint-system ranking defined above, I will try to use this constraint system to account for the separate phrasing of the subject in di-transitive sentences.

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over the constraint (C2) $\phi$  in that it accounts for the separate phrasing of not only the lower complement but even that of the subject, killing two birds with one stone.

Although I have no data to illustrate this case, the tableau below makes it clear that the constraint system is able to predict the separate phrasing of the subject.

**Tableau (9)**

$[CP\ C\ [TP\ XP\ T\ [vP < XP > v\ [VP\ V\ YP\ ZP]]]]$	$v^* Part_{Max}$	$Non-Rec$	$(Complex)\phi$
a.(XP) $\phi$ (V YP) $\phi$ (ZP) $\phi$			*
b.(XP) $\phi$ (V YP ZP) $\phi$	*		**
c. (XP) $\phi$ (V) $\phi$ ( YP) $\phi$ (ZP) $\phi$	*		

#### 5.4.2.3.3 Kimatuumbi: ((VO) $\phi$ (O) $\phi$ )

Truckenbrodt (1995) indicates that Kimatuumbi, unlike Chichewa and Chi Mwi:ni, has a recursive (major) phonological phrase structure in the case of a head with two complements as shown below. Such simultaneous presence of two types of p-phrasing within the same language can be easily predicted by OT.

[<sub>XP</sub> X YP ZP]  
(( ) $\phi$  ) $\phi$  (Truckenbrodt, 1995, p.117)

##### 5.4.2.3.3.1 Previous (End-Based) Account: (Truckenbrodt, 1995; Kager & Zonneveld, 1999)

Truckenbrodt (1995) indicates that although the existence of recursive prosodic structure is ruled out by the Strict Layer Hypothesis<sup>189</sup> (Selkirk, 1984), Selkirk (1995) relaxes the ban on recursion by turning Nonrecursivity into a violable constraint in OT. This is also made explicit in Truckenbrodt (1995) by indicating that "Nonrecursivity (*NonRec*) disfavors recursive structure, but allows it under certain circumstances" (p. 122).

To account for the recursive structure in Kimatuumbi, Truckenbrodt ranks *NonRec* below *Align-XP*, *R* and *Wrap-XP*. As for the ranking of *Align-XP*, *R* and *Wrap-XP* in relation to each other, Truckenbrodt leaves them equally ranked to allow the two observed types of p-phrasings emerge as optimal. Accordingly, the constraint ranking system for Kimatuumbi is: *Align-XP,R, Wrap-XP >> NonRec*. To illustrate how this constraint

<sup>189</sup> See Chapter 2 of this work for some details on the Strict Layer Hypothesis.

ranking system can account for the optimal result in the case of a verb with two complements, consider the following sentence taken from Truckenbrodt (1995) and its assumed tableau.

Example (9) ((naampéi kikóloombe)φ Mambóondo)φ

I-him-gave shell Mamboondo

I gave Mamboondo the shell (p. 121)

**Tableau (10)**

[ V YP ZP] VP	Align-XP,R	Wrap-XP	Non-Rec
☞ a.((V YP)φ (ZP)φ			*
b. (V YP)φ (ZP )φ		*	
c. (V YP ZP )φ	*		

#### 5.4.2.3.3.2 New Account

Exhibiting a recursive φ structure of the pattern ((VO)φ O)φ, Kimatuumbi can be taken as a case study exemplifying the superiority of a constraint-based OT account over a parameter-based minimalist account<sup>190</sup>. As it has been indicated earlier in this chapter, Truckenbrodt (1995) states that variations within a single language as it is the case with Kimatuumbi posit a problem for a parameter-setting theory. Truckenbrodt thus concludes that a parameter-setting theory “will only derive half of the facts” as compared with a constraint-based theory which “does not have these problems: The relevant factors *Align-XP* and *Wrap-XP* are thus assumed to be present in all languages. Even though in most languages, the effects of one will override the other, it can also be represented that both show their effects in a single language<sup>191</sup>”(Truckenbrodt, 1995, p. 93).

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<sup>190</sup> However, there are perhaps two ways to account for the recursive φ structure in Kimatuumbi. The first is the difficult one and it is to assume that variations in p-phrasing can be the function of a *genuine, though a recursive, mapping mechanism*, a difficult path I am not going to take. The second is the one I follow here building on the superiority of a constraint-based account over a parameter-based minimalist account.

<sup>191</sup> According to Truckenbrodt (1995), Chi Mwi:ni is a language where Align-XP,R overrides Wrap-XP, Chichewa is a language where Wrap-XP overrides Align-XP,R and Kimatuumbi is, however, a language where both Align-XP, R and Wrap-XP are equally ranked resulting in a recursive φ structure.

Thus, I will attempt below to develop a constraint system for Kimatuumbi. As it is indicated by the recursive  $\phi$  structure  $((VO)\phi \ O)\phi$ , Kimatuumbi exhibits two simultaneous p-phrasing patterns:

- 1- One p-phrasing pattern is the same as that noticed in Chi Mwi:ni namely  $(VO)\phi$   $(O)\phi$ . This pattern of phrasing is accounted for earlier while handling Chi Mwi:ni by the constraint  $v^* Part_{(Max)}$ . Thus, I assume that the same constraints and ranking system used to account for phonological phrasing in Chi Mwi:ni are in effect in Kimatuumbi.
  - Chi Mwi:ni:  $v^* Part_{(Max)} >> (Complex)\phi$
- 2- The other observed p-phrasing pattern is  $(VOO)\phi$  which is the same pattern as that found in Chichewa. I accounted for this phrasing pattern while discussing Chichewa as resulting from the high ranking of the constraint  $v^* Full$ . Thus, and in line with Chichewa, I assume that the constraint  $v^* Full$  is also dominant in Kimatuumbi.
  - Chichewa:  $v^* Full >> (Complex)\phi$

Thus, we are led to conclude that the constraint system for Kimatuumbi should include the following constraints:  $v^* Part_{(Max)}$ ,  $(Complex)\phi$  and  $v^* Full$ . Ranking these constraints relative to each other is not a difficult issue after all.  $v^* Part_{(Max)}$  and  $v^* Full$  will have the same rank in the constraints ranking to allow both types of p-phrasing, predicted by them, to equally emerge as optimal. As for the constraint  $(Complex)\phi$ , it will continue to be ranked below them as it is the case in Chichewa and Chi Mwi:ni. One constraint will be added here and it is *NonRec*, used before in the previous end-based account. In contrast with both Chichewa and Chi Mwi:ni, this constraint will be ranked low in Kimatuumbi to allow recursive structure. Thus, the constraint system for Kimatuumbi will include the following constraints:

- i.  $v^* Part_{(Max)}$ : Define the verb and its first complement together onto a single  $\phi$ .
- ii.  $v^* Full$ : Define the whole domain of a phase head  $v^*$  onto a single  $\phi$ .
- iii.  $(Complex)\phi$ :  
Define (complex) phrases onto their own separate  $\phi$ s (to the exclusion of any other material).
- iv.  $NonRec$ : Phrases are not recursive (violable)

Employing the constraints above, I will present below the tableau that accounts for the two p-phrasing patterns of the sentence mentioned and accounted for above within the previous end-based account. This sentence is repeated below.

Example (10) ((naampéi kikóloombe)φ Mambóondo)φ

**Tableau (11)**

$[_{vP} \quad v \quad [vP \quad V \quad YP \quad ZP]]$	$v^* \text{ Part}_{(Max)}$	$v^* \text{ Full}$	<i>Non-Rec</i>	<i>(Complex)φ</i>
a. ((V YP)φ ZP)φ			*	***
b. (V YP)φ (ZP)φ		*		*
c. (V YP ZP)φ	*			**

#### 5.4.2.3.4 Xhosa: (SVO)φ, (SVOO)φ

##### 5.4.2.3.4.1 Previous Account: Zerbian (2004)

a. P-phrasing under broad focus: (SVO)φ (SVOO)φ

Within Zerbian (2004), the phrasing of the subject with other elements under broad focus is accounted for by the constraint ranking system: \*P-Phrase , Wrap-XP >> Align-XP, R<sup>192</sup>. The following sentence is taken from Zerbian, 2004 after Jokweni, 1995.

Example (11).

(Lé ndod' i-béth' abántwaana) φ

this man SC-beat children

‘This man beats children’ (p. 94)

The following tableau from Zerbian (2004) accounts for the observed phrasing pattern in the mono-transitive sentence above.

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<sup>192</sup> Zerbian (2004) indicates that the phrasing of the subject with other elements under wide focus can also be accounted for if one revises the syntactic structure, more specifically if one assumes that the subject is internal to VP and in which case Wrap-XP applies resulting in the subject being wrapped with all other elements onto a single MaP. However, this account as Zerbian himself indicates is a problematic one as there is no syntactic evidence for the subject-in-VP hypothesis in Xhosa.

**Tableau (12)**

[S [V XP] VP] <sub>IP</sub>	*P-Phrase	Wrap-XP	Align-XP, R
a. ( S V XP)φ	*		**
b. ( S)φ (V XP)φ	**!		*

(p. 94)

- b. Phrasing in the case of a focused verb with two complements: (SV)φ (XP)φ (XP)φ.

Moreover, in his account of the p-phrasing patterns in Xhosa, Zerbian (2004) uses one more constraint to account for the phrasing emerging under narrow focus and this constraint is Align-Foc, defined below. Accordingly, the high ranking of the constraint Align-Foc over the constraints used above to account for phrasing under broad focus can account for the phrasing emerging under narrow focus.

- *Align-Foc*<sup>193</sup>: *Align (Foc, R; P,R)*

Each focused constituent is right-aligned with a p-boundary (Zerbian, 2004, p. 90).

However, the constraints system mentioned above runs into problems in the case of a focused verb with two complements. Accordingly, even if one ranks the constraint Align-Foc the highest, the right candidate (SV)φ (XP)φ (XP)φ still cannot be predicted. The two tableaus below show how the right candidate is always ruled out<sup>194</sup>.

**Example (12)**

(ndi-ya-m-phékel')φ    (úmaam')φ    (ínyaama)φ  
 SC-YA-OC1-cook.for    mother 1    meat

‘I cook for her, mother, meat.’ (Zerbian, 2004, p. 95, after Jokweni, 1995)

<sup>193</sup> This constraint is first proposed by Truckenbrodt (1995) to account for the p-phrasing pattern emerging under narrow focus in Chichewa.

<sup>194</sup> Zerbian (2004) tries to use the constraint \*P-phrase both as a gradient constraint and as a non-gradient constraint in tableaus (13) and (14) respectively to help him predict the right candidate but with no benefit.

**Tableau (13)**

[S VFOC]VP [XP] [XP]	Align-FOC	*P-Phrase	Wrap-XP	Align-XP, R
a.( S V XP XP) $\phi$	*!	*		**
??" b.( SV) $\phi$ (XP XP) $\phi$		**		*
c.( SV) $\phi$ (XP) $\phi$ (XP) $\phi$		***!		

(Zerbian, 2004, p. 95)

**Tableau (14)**

[S VFOC]VP [XP] [XP]	Align-FOC	*P-Phrase	Wrap-XP	Align-XP, R
a. (S V XP XP) $\phi$	*!	*		***
b.(SV) $\phi$ (XP XP) $\phi$		*		**!
c.(SV) $\phi$ (XP) $\phi$ (XP) $\phi$		*		*!
??" d.( S) $\phi$ (V) $\phi$ (XP) $\phi$ (XP) $\phi$		*		

(Zerbian, 2004, p. 95)

To wrap up, and as it is indicated above, Zerbian's (2004) account of p-phrasing in Xhosa has a problem in predicting the optimal phrasing pattern (SV) $\phi$  (XP) $\phi$  (XP) $\phi$  emerging in the case of a focused verb with two complements. The new account I will develop below will have no such a problem. The new constraints and their ranking will help us to account for all observed p-phrasing patterns both under wide and narrow focus without any need to revise the syntactic structure (see footnote 192 above).

#### 5.4.2.3.4.2 New Account

In this part, I attempt a new OT account of the Xhosa data mentioned above and I base this account on the following assumed syntactic, phonological and interface facts:

1-Xhosa is a language with the p-phrasing types (SVO) $\phi$  (SVOO) $\phi$  (Seidl, 2001; Zerbian, 2004).

The main interface constraint assumed within Zerbian (2004) to account for this pattern of phrasing is *Wrap-XP*.

2-Xhosa is a (symmetric) language with V-to-T movement (Seidl, 2001).

3-Narrow focus leads to:

- a. Insertion of a boundary to the right of the focused element.
- b. Syntactic changes in the complement structure in Xhosa (Zerbian, 2004): More specifically, when the verb is focused, the object/s representing old information is/are moved out of the VP, and the optional object/s is/are no longer complement/s but adjunct/s to VP (Zerbian, 2004). Moreover, Zerbian (2004) indicates that within Jokweni's (1995) algorithm for phonological phrasing in Xhosa, adjuncts or adjoined elements (to a maximal projection) constitute their own MaPs (see Zerbian, 2004 for more details).

*The above-mentioned points and their implications can be read within the new analysis as follows:*

- 1- Xhosa is a V-to-T language ---> It is a language with late spell-out viz spell-out can be delayed till C enters the scene.
- 2- The p-phrasing patterns in Xhosa are (SVO) $\phi$  and (SVOO) $\phi$  --->
  - I. C has strong wrapping instruction to wrap the whole (available) domain onto a single domain  $\phi$ . Hence the constraint  $C_{Full}$  is in effect.
  - II. When C is merged, spell-out on the lower (slided) phase is ignored, that is,  $v^*$ 's spell-out instruction is overridden by the strong wrapping instruction of C and this can be explained in OT by highly ranking the constraint  $C_{Full}$ .
  - III. Worth mentioning is that Zerbian (2004) indicates that the constraint *Wrap-XP* is motivated in Xhosa mainly by the p-phrasing pattern observed under wide focus in double object construction where the verb and its two complements are phrased together. Thus, in the new proposed constraints system for Xhosa, I am going also to include the constraint  $v^*_{Full}$  whose effect amounts to that of *Wrap-XP*. Worth mentioning here is that the assumption that the constraint  $v^*_{Full}$  (or *Wrap-XP*) has a role in Xhosa, can find a justification within the new spell-out-based account in the following way. If Xhosa is a V-to-T language and if the instruction of  $v^*$  is to wrap

the verb with all material in its domain onto a single domain, then spell-out is to happen late via PIC2 ensuring head movement, and when C merges, it discharges its strong wrapping instruction overriding (overwriting) the instruction of the lower phase and thus we can only see spell-out on the CP phase expressed in OT by the constraint  $C_{Full}$  being the highest-ranked constraint. As for the instruction  $v^*_{Full}$  of the lower phase head  $v^*$ , it is obscured or overridden, and in OT terms we say that the constraint  $v^*_{Full}$  is ranked lower than the constraint  $C_{Full}$ .

### 3- Narrow focus:

- a. Insertion of a boundary to the right of the focused element: Zerbian (2004), after Truckenbrodt (1995), uses the constraint *Align-FOC* which entails that each focused constituent is right-aligned with a p-boundary.

However, since directionality is not assumed within the spell-out-counterpart of the OT account developed in this chapter, I replace the constraint above with the constraint *After-Focused*, used earlier in this chapter to account for p-phrasing under narrow focus in Chichewa.

#### *-After-Focused:*

A focused constituent introduces a  $\phi$ -boundary after it (between it and following elements).

- b. Syntactic dislocations of the object/s in Xhosa---> I assume the general constraint  $(Complex)\phi^{195}$  is in effect which can account for the separate phrasing of (dislocated) phrases.

In the following I will present a new OT account of the observed phrasing patterns in Xhosa. The new constraint system for Xhosa will include the following constraints:

- i.  $C_{Full}$ ,
- ii.  $v^*_{Full}$
- iii. **\*P-Phrase:** Avoid phonological phrases altogether.

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<sup>195</sup> It is assumed in literature that complex adjuncts (Uriagereka, 1999) and complex phrases (Narita & Samuels, 2009) form their own separate phrases.

- iv. (*Complex*) $\phi$ : Define (complex) phrases onto their own separate  $\phi$ s (to the exclusion of any other material).).
- v. *After-Focused*: A focused constituent introduces a  $\phi$ -boundary after it .

I present below some of the sentences mentioned within Zerbian (2004) with their new tableaus. Two of these sentences have already been used above to illustrate Zerbian's (2004) OT account of p-phrasing in Xhosa.

### A: Sentences under broad focus

Example (13)

( SVO structure type):

(Lé ndod' i-béth' abántwaana) $\phi$

'This man beats children'

**Tableau (15)**

$[_{CP} C [_{TP} Subj T [_{VP} <Subj> V [_{VP} V Obj]]]]$	$C_{Full}$	$V^*_{Full}$	$(Complex)\phi$	$*P\text{-Phrase}$
☞ a.( S V O ) $\phi$		*	**	*
b.(S) $\phi$ (VO ) $\phi$	*		*	**

Example (14)

(the case with double object constructions)

(ba-ník' úmam' úkuutyá)  $\phi$

Sc-give mother food

'They give the mother food.' (Zerbian, 2004, p. 86, after Jokweni, 1995)

**Tableau (16)**

$[_{CP} C [_{TP} T [_{VP} V [_{VP} V YP ZP ]]]]$	$C_{Full}$	$V^*_{Full}$	$(Complex)\phi$	$*P\text{-Phrase}$
☞ b. (V YP ZP ) $\phi$			**	*
a.(V YP) $\phi$ ( ZP) $\phi$	*	*	*	**
c. (V) $\phi$ (YP) $\phi$ ( ZP ) $\phi$	*	*		***

## B: Sentences under narrow focus

Example (15): Narrow focus on the verb

(ndi-ya-m-phékeel') $\phi$  (úmaam') $\phi$  (ínyaama) $\phi$

SC-YA-OC1-cook.for mother1 meat

'I cook for her, mother, meat.'

(Zerbian, 2004, p. 95, after Jokweni, 1995)

**Tableau (17)**

$[CP C [TP T [_{vP} V [VP V_{FOC} <XP> <XP> ]]]]$	<i>After-Focused</i>	$C_{Full}$	$V^*_{Full}$	$(Complex) \phi$	*P-Phrase
a.(SV) $\phi$ (XP) $\phi$ (XP ) $\phi$		*	*		***
b.( S V XP XP ) $\phi$	*		*	**	*
c.(SV) $\phi$ (XP XP) $\phi$		*	*	**	**
d.( S) $\phi$ (V) $\phi$ (XP) $\phi$ (XP ) $\phi$		*	*		****

Example (16): Narrow focus on the subject

(abántwaana) $\phi$  (ba-kháb' íbhóóla) $\phi$

Children2 SC-kick ball

The children kick the ball.'

(Zerbian, 2004, p. 97, after Jokweni, 1995)

**Tableau (18)**

$[CP C[TP Subj_{FOC} T [_{vP} <Subj> v [VP V Obj]]]]$	<i>After-Focused</i>	$C_{Full}$	$V^*_{Full}$	$(Complex) \phi$	*P-Phrase
a. ( S) $\phi$ (V O ) $\phi$		*		*	**
b. (S V) $\phi$ (O ) $\phi$	*	*	*	*	**
c. (S V O ) $\phi$	*		*	**	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$		*	*		***

To conclude, if I am ever right, the proposed constraints and their ranking system above prove to be successful in accounting for the phonological phrasing patterns in Xhosa defined within Zerbian (2004), even those under narrow focus.

## 5.5 Summary

In this chapter, I have attempted to formulate OT-counterpart of the spell-out parameters/features that already exist in the minimalism account developed in the previous chapter. Replacing one postulate by another may not seem, at first glance, a real gain. However, this replacement proves to be a superior one in that it results in a constraint-based system with entirely different properties which makes it empirically superior to the minimalist parametric account developed in the previous chapter, by being able to accommodate more variations than the minimalist account would ever do.

As it has been shown in this chapter, the new (spell-out-based) OT grammar helps us to successfully account for a wide range of data. Employing the new OT constraints, we are able not only to account for the p-phrasing differences between languages (Chichewa, Chi Mwi:ni and Xhosa) but even for variations within the same language, a case study exemplified by Kimatuumbi, and for emerging  $\phi$  boundaries under narrow focus, a case study illustrated by Chichewa.

## CHAPTER - 6

### Phonological Phrasing in San'ani Yemeni Arabic

#### **6.1 Introduction**

This chapter aims at developing a phonological phrasing algorithm for SVO declarative sentences in San'ani, the dialect of Arabic spoken in San'aa, Yemen. Employing both phonological and durational cues to phrasing, the surface phonological phrasing for SVO sentences will be established and the reached phrasing algorithm/s will be finally accounted for within both the new spell-out-based account and the OT one.

Generally speaking, the phonology of San'ani above the word level has received little attention. Worth mentioning is that some of the phonological processes in San'ani both at and above the word level have been covered in studies as that of Watson (2002). However, there exists no single study of San'ani phonology that has attempted, employing both phonological and phonetic cues to phrasing, to establish the surface phonological phrasing in San'ani and to account for this p-phrasing within the current syntax-phonology interface perspective.

##### **6.1.1 San'ani Yemeni Arabic: A Brief Introduction**

Yemeni Arabic (YA) is a stress accent language due to the characteristics of its word prosody which means that stress is a lexical property of words. San'ani is a variety of YA spoken in the north and as a variety of Yemeni Arabic, San'ani still enjoys all the stress-accent features. The best-known study on San'ani Arabic is that by Watson (2002) where the lexical stress facts are defined as well as some of the major phonological processes.

According to Watson (2002), the algorithm for San'ani stress is as follows:

- a. Stress the rightmost non-final CVV or CVG syllable.
- b. Otherwise stress a final CVVC/CVCC syllable.
- c. Otherwise stress the rightmost non-final CVC syllable up to the antepenultimate.
- d. Otherwise stress the leftmost CV syllable.
- e. Stress final CVV in disyllabic adjectives or di-or trisyllabic verbs in the imperfect (p. 82.)

## 6.2 The Existence of the MaP in Some Arabic Varieties

Some studies on Arabic as Watson (2002), Hellmuth (2004), and Chahal (1999) among others show phonological and/or phonetic evidence for the existence of the (major) phonological phrase level in some Arabic varieties. Accordingly, there are mainly two levels of phrasing above the phonological word namely the major phonological phrase (MaP) and the intonational phrase (IP).

To elaborate, Watson (2002) defines the (major) phonological phrase as a domain for the application of rules both in San'ani and Cairene. This study mainly refers to the phonological word and the (major) phonological phrase, though it also refers to the clitic group as a domain for rule application in San'ani. More importantly, Watson (2002) defines many prosodic and melodic rules as having the (major) phonological phrase as their domain of application. To illustrate, we have vowel deletion which is defined by Watson (2002) as taking the (major) phonological phrase as its domain of application in both San'ani and Cairene to eliminate an onsetless syllable. The following two examples from Watson (2002) illustrate the application of the vowel deletion rule in San'ani and Cairene respectively.

- 1) San'ani: aštī azrag → aštī zrag  
(aštī = I want, azrag = blue → I want blue) (p. 229)
- 2) Cairene: Šuftu imba:riħ → Šuftu mba:riħ  
(Šuft= I saw, u=him, imba:riħ= yesterday →I saw him yesterday) (p. 229)

On the other hand, Hellmuth (2004) uses both phonological and phonetic cues to prove the existence of the major phonological phrase in Cairene. The phonological cue is the rule of epenthesis which is defined within Watson (2002) as having the MaP level as its domain of application. The phonetic cues are some of those used within the theories of phonology and intonation as the autosegmental metrical theory. Notably, Hellmuth (2004) also indicates the existence of what is known as the minor phonological phrase in Cairene and she indicates that the minor phrase boundary is tonally marked. To quote her own words, “the pitch accent at the right edge of the MiP shows local final lowering, and

is followed by a local pitch reset at the start of the new MiP''(Hellmuth, 2004, p. 11). She also indicates that the MaP in Cairen consists of at least two minor phonological phrases. One more study to mention here is that of Chahal (1999) who develops a model of Lebanese Arabic intonation using the autosegmental-metrical framework of intonational phonology. Her study is a phonetic one and she defines three prosodic constituents: the intonational phrase, the intermediate phrase or MaP and the prosodic word. Worth mentioning here is that Chahal does not talk about any level mediating between the MaP and the phonological word.

In a word, the existence of the MaP in Arabic is evidenced by either phonological or phonetic cues to phrasing, and sometimes by both as it is the case in Hellmuth (2004). As far as San'ani is concerned, the domain of the MaP gets identified in Watson (2002) via only phonological cues to phrasing. The following section, however, will provide both phonological and durational evidence for the existence of the MaP in San'ani, and the interesting thing is that both the phonological and durational cues work together in a perfect way to demarcate the edges of MaPs in San'ani.

## **6.3 Experiment**

### **6.3.1 Aim of Study**

The main aim here is to develop a phonological phrasing algorithm for SVO sentences in San'ani Yemeni, employing both phonological and durational cues to phrasing.

### **6.3.2 Method**

#### *6.3.2.1 Data*

The data mainly consist of sentences of SVO structure. Potential environments for the application of the /t/ assimilation rule in SVO sentences are created between the subject and verb as well as between the verb and the object.

I have three male informants (F, M, A) in their early thirties. For two of the informants (M, A), I depend on perception to decide whether the /t/ assimilation rule applies or not. However, the full set of targets is recorded with informant F. Informant F is asked to provide three random repetitions of the SVO data, two times at slow speech rate and one

time at a fast(er) speech rate. The total number of tokens for mono-transitive sentences is 15 tokens (5 targets x 1 speakers x 3 repetitions). However, the data also include two extra small sets. The first set includes two extra sentences of the SVO structure with varying subject length: one of the sentences has a subject of two prosodic words and the other has a subject of four prosodic words. Each sentence is also repeated 3 times (2 targets x 1 speakers x 3 repetitions), two at slow rate of speech and one at a fast(er) speech rate. In the second set, one di-transitive sentence of the structure DP V DP DP is used and is randomly repeated 7 times (1 target x 1 speakers x 7 repetitions), four times at slow speech rate and three times at a fast(er) rate of speech. Thus, the sum of the tokens used is 28 tokens<sup>196</sup>. It will be shown later that while the the data from di-transitive help us define the phonological level being cued, the extra data on SVO structure with varying subject length help us define the prosodic weight factor in effect in San'ani, if any. Recordings are made in a sound-proof room and the sentences are analyzed using Praat 5.3.35 (Boersma & Weeninck, 2012).

#### A. *The mono-transitive sentences*

1-Arabic: mirfat da ʕit do ʕa

S      V      O

English: Mirfat prayed a prayer

2- Arabic: al-bint da ʕit do ʕa

S      V      O

English: The girl prayed a prayer.

3- Arabic: al-bint da ʕit dina

S      V      O

English: The girl called Dina

4- Arabic: al-bint dabaxat daggah

S      V      O

English: The girl cooked mince.

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<sup>196</sup> One thing to indicate here is that the informant (F) is also asked to pronounce each of the words used in the sentences two times in isolation.

5- Arabic: al-bint dabaxat dabiix

S V O

English: The girl cooked food.

*B. One di-transitive sentence*

1- Arabic: imaan nawalat al-bint diftaar

S V IO DO

English: Imaan gave the girl a notebook.

*C. Two additional mono-transitive sentences*

1- Subject consisting of 2 prosodic words

Arabic: om mirfat daʕit daʕwa

S V O

English: Mirfat's mother prayed a prayer.

2- Subject consisting of 4 prosodic words

Arabic: om THabet dabwan al-hoot daʕit dina

S V O

English: Thabet Dabwan Al-hoot's mother called Dina.

### 6.3.2.2 Cues Employed: Phonological and Durational Cues to Phrasing

I mainly depend on the application/non-application of the phonological rule of [t] regressive assimilation to determine the surface phonological phrasing in San'ani. The fact that the rule applies or not is determined by both human perception and the cues in the waveform and its spectrogram. However, and in addition to the phonological rule of [t] regressive assimilation, I also employ some durational cues to support the phonological evidence. Preceding vowel duration and closure duration are used to emphasize whether the [t] assimilation rule takes place or not. Moreover, the factor of pre-boundary lengthening is used to decide whether a boundary exists or not.

### 6.3.2.2.1 A Phonological Cue: [t] Assimilation Rule

't' regressive assimilation occurs across words when the last consonant in a given word is [t] and the first consonant in the following word is [d]. The rule here is that the [t] sound totally assimilates to the following [d] sound by assimilating voicing as indicated below.

t	→	d	/—/	d
Voicing:		*voiceless		* voiced
Manner of art.		stop		stop
Place of art.		alveolar		alveolar

The application/non-application of the rule is decided via both:

*I. Human perception*

*II. Acoustic correlates of [t] total assimilation to [d]*

Both [t] and [d] are stop consonants, and according to Ladefoged (2001), stop consonants can be distinguished on a spectrogram as a brief silence or gap in pattern (visible as a vertical, blank band in the spectrogram) followed by burst of noise for voiceless stops or sharp beginning of formant structure for voiced stops.

Generally speaking voicing in stops can be determined by:

1-Visualizing the waveform of a sound

One can distinguish between [d] and [t] in the waveform itself by:

- a. Voicing: An important difference between [t] and [d] is that voiced [d] can show voicing vibration in the waveform during the closure [and release] but not [t]<sup>197,198</sup>. The vibration seen in the waveform can also be seen in the spectrogram as a *band* of energy in the lower frequencies known as the voice bar<sup>199</sup>.

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<sup>197</sup> Ladefoged (2001) indicates in Chapter 6 that in Sindhi a fully voiced stop [d] show voicing throughout the closure and the release and in which case it will have a negative VOT value. A voiceless stop [t], on the other hand, can show no vibration during the closure and voicing starts very shortly after the closure, with VOT being less than 20 ms.

<sup>198</sup> The vibration seen in the waveform can even be made clearer if one uses the option *show pulses* as the pulses (vertical lines in blue color on the waveform) correspond to the vibration of the vocal cords.

<sup>199</sup> However, vibration of the vocal folds is not always the cue to voicing in worlds languages and this point is indicated in Alvarez González (1979) and to quote his own words " It was noted that in English, and in other languages too, vocal fold vibration is not a necessary cue to differentiate voiced from voiceless consonants, since it may not be present, at least in some positions, and the opposition continues to be

- b. In the case of [t], there is a spike indicating the burst of noise when the stop closure is released; in the case of [d], there is no real spike at the beginning, just a somewhat irregular waveform before the start of the following vowel<sup>200</sup>.

## 2- Visualizing the spectrogram of a sound (Formant structure)

- a. Voice bar at the bottom of the spectrogram

The phonetic difference between voiced and voiceless sounds is indicated in a spectrogram by the presence or absence of a voicing bar (F0) at the bottom of the spectrogram. Voiced sounds as [d] have a voice bar during the consonant closure while voiceless consonants as [t] don not have this band.

- b. Formants (mainly F1, F2,F3)

As it has been indicated above, [d] is differentiated from [t] on a waveform by the vibration of the vocal folds and this vibration results in a formant structure similar to that of vowels (i.e., F1, F2, F3). Voiceless sounds, on the other hand, exhibit no vibration of vocal folds and hence no formants.

### 6.3.2.2 Durational Cues

Moreover, the application vs. non-application of the [t] regressive assimilation rule is cued by acoustic measures which include stop closure duration and preceding vowel duration. One more durational cue is also employed whenever needed. This cue is pre-boundary lengthening and it is used to support the (spectral and other durational) cues to [t] assimilation.

operating, so the use of voiced and voiceless to mark such oppositions was questioned" (p. 45). One related point to mention here is that it has been indicated and shown that the difference between [t] and [d] in American English is not signaled by the voicing closure as both [t]and [d] exhibit no vibration during closure. The exact detail of this finding can be found in the following link : <http://linguistics.stackexchange.com/questions/11/what-is-the-difference-between-voiced-and-voiceless-stop-consonants>

The following are some of the features generally assumed for [t] and [d] in English:

[d] : 1- in initial position, [d] is partially devoiced ..

2- in medial position, especially between voiced sounds, [d] is fully voiced.

3- in final position, fully devoiced (e.g., old, mad)

4- when followed by a plosive, no audible release

[t] : 1- when followed by a plosive, no audible release (e.g., head boy, red car)

<sup>200</sup> See the beginning of Chapter 3 in Ladefoged (2001).

### 3- Preceding vowel length (duration)

This durational cue is used to decide whether [t] assimilates to [d] or not. Actually, when [t] assimilates voice from a following [d], [t] totally assimilates to [d] and thus we obtain a phonologically derived geminate. The duration of the preceding vowel can often be used as an important cue to gemination. It is assumed in many studies as that of Ridouane (2010) that post-lexical geminates arising from total assimilation (assimilated geminates), like lexical geminates, shorten the preceding vowel. The way this variable is to be employed is indicated later in this chapter in the section entitled *discussion and results1*.

### 4- Closure duration

Closure duration is signaled in the spectrogram by a complete silence. Generally speaking, voiced consonants are systematically shorter than their voiceless counterparts. It has been documented for many languages that while vowels are durationaly longer before voiced consonants than before voiceless ones, consonant closures are shorter for voiced obstruent than for voiceless obstruent.

### 5- Pre-boundary lengthening

It is generally assumed that the duration of phrase-final syllables should be longer than the duration of the same syllables in phrase-initial position. I will use this cue only in cases where assimilation, cued by other variables, does not seem to apply suggesting the existence of a boundary. Thus, the cue of the pre-boundary lengthening will be used to reinforce the fact that there is a boundary at the point where assimilation fails to apply

**Table (1): Variables used in the experiment**

<b>Name of the variables used in the experiment</b>	
<b>Durational measures</b>	<b>Other measures</b>
<p><i>1- Gemination cues</i></p> <ul style="list-style-type: none"> <li>a. Preceding vowel duration (will be used only in case the geminate is preceded by a vowel)</li> <li>b. Closure duration.</li> </ul> <p><i>2- Last syllable duration.</i></p>	<p><i>1- Visualizing the waveform (Variables in the waveform itself):</i></p> <ul style="list-style-type: none"> <li>a. The voicing vibration during the closure for [d].</li> <li>b. Spike indicating the burst of noise for [t].</li> </ul> <p><i>2- Visualizing the Spectrogram (Variables in the spectrogram):</i></p> <ul style="list-style-type: none"> <li>a. The voicing bar at the bottom of the spectrogram.</li> </ul> <p><i>3- Human perception</i></p>

### 6.3.3 Discussion and Results

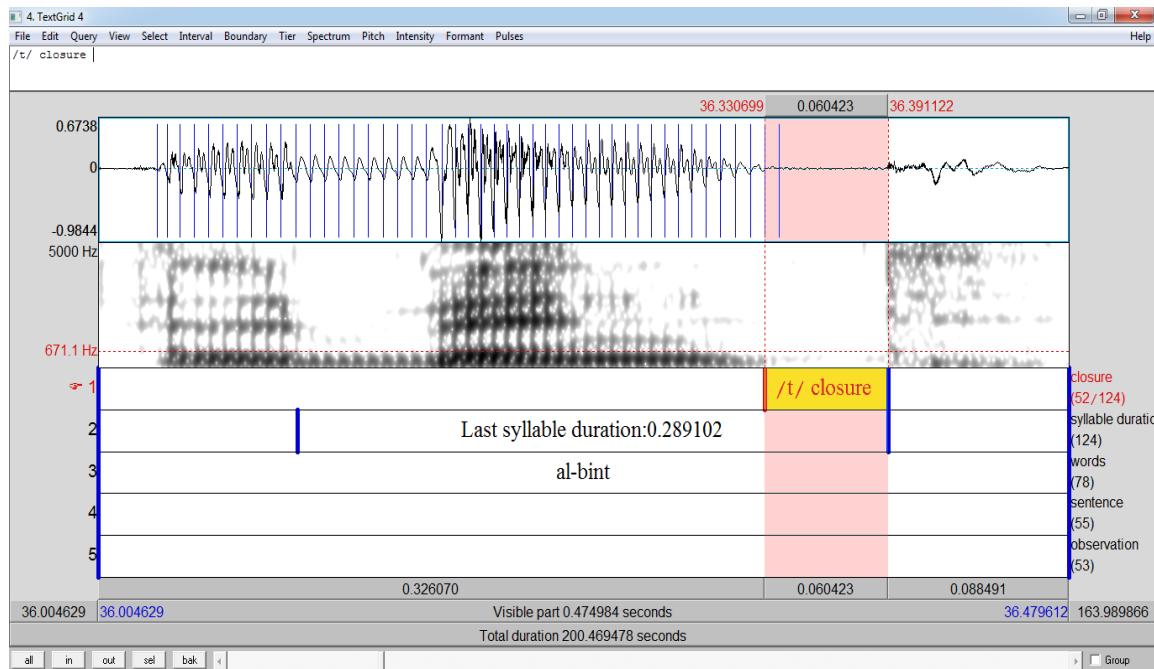
#### 6.3.3.1 Discussion and Results 1: Phrasing Cues

[t] assimilation (of voicing) to [d] is visibly evidenced by three things:

1- Visualizing the waveform: Whether [t] undergoes assimilation to [d] (resulting in assimilated geminate [dd]) or not is something that can be distinguished in the waveform itself by:

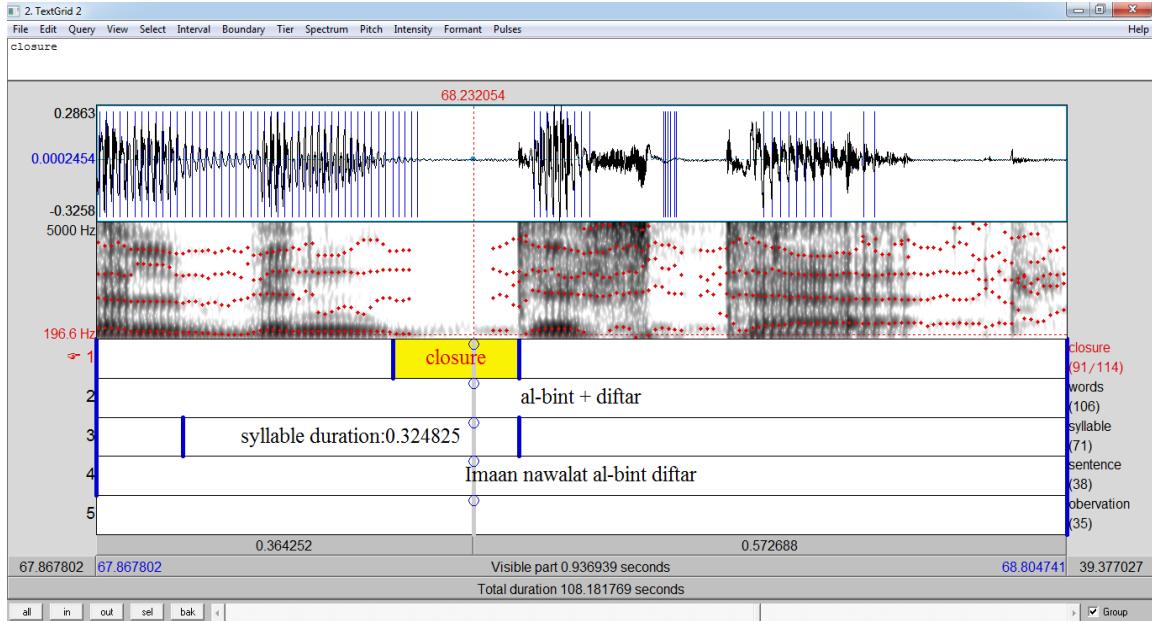
- a. Closure voicing: On the one hand, and on visualizing the waveforms, it is noticed that when [t] assimilates to [d] we get a fully voiced assimilated geminate [dd] signaled by the voicing vibration through (whole/most) of the closure. On the other hand, when voiceless [t] does not undergo voicing assimilation, this can be easily determined by having a flat waveform closure indicating no vibration of vocal cords during closure and hence no voicing. The assimilation and non-assimilation contrast can be made clear by comparing the waveform (and also spectrogram) of the word *al-bint* in the context where it undergoes assimilation, with the waveforms of both the context where it does not undergo assimilation, and when it is pronounced in isolation. As an illustration, we have below three waveforms (with their spectrograms) for the word *al-bint*. The first waveform is for the word *al-bint* pronounced in isolation illustrating the case of released

voiceless [t] and this is made clear by the waveform showing no vibration during closure. The second waveform illustrates the case where unreleased [t] in *al-bint* undergoes no assimilation in the context of *imaan(Subj) nawalat(V) al-bint (Obj) diftaar(Obj)* and the fact that [t] undergoes no voicing assimilation is reflected in the waveform itself which exhibits no voicing vibration at the first portion of the closure<sup>201</sup>. The last waveform instantiates the case where [t] undergoes voicing assimilation in the context of *al-bint (Subj) da ɻit (V) dina (Obj)* and this voicing is seen in the waveform as a vibration that continues through (almost) the whole closure resulting in a fully voiced assimilated geminate [dd].

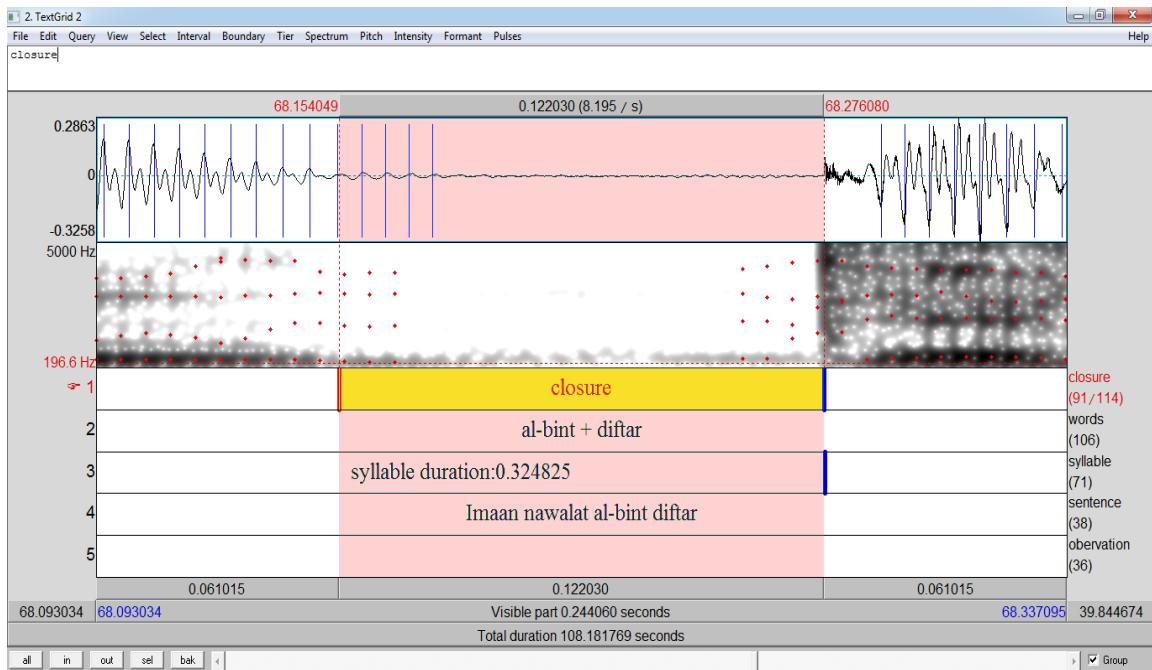


**Waveform 1:** *al-bint* pronounced in isolation illustrating the case of released voiceless [t]

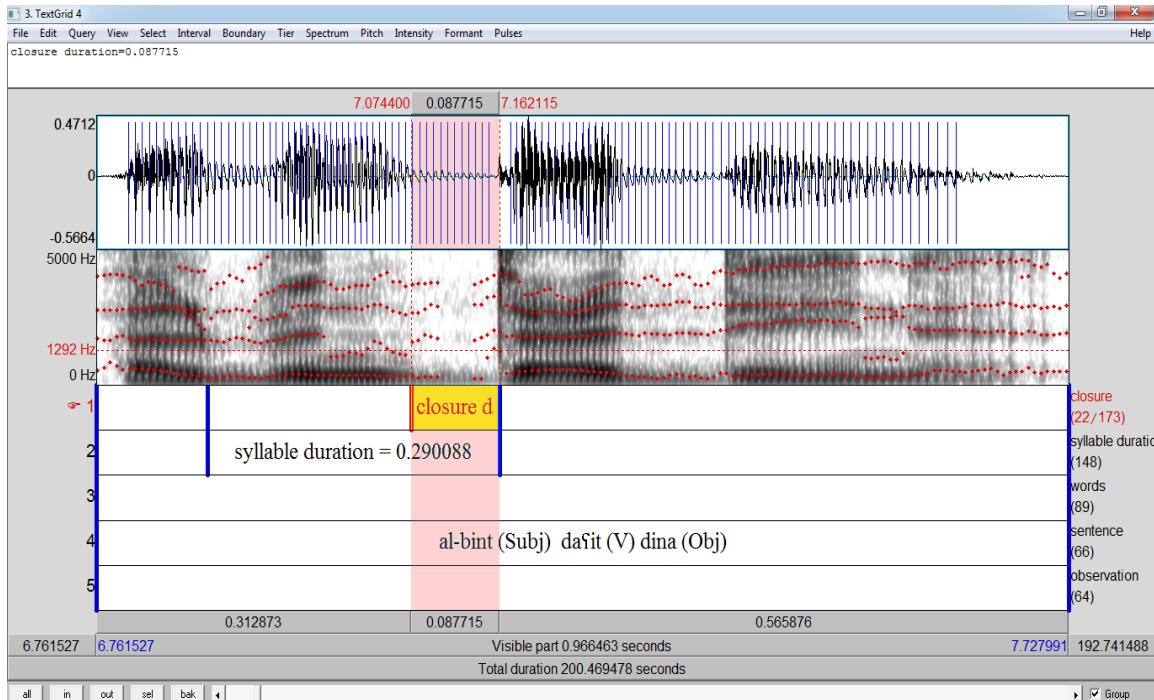
<sup>201</sup> However, in some cases, there is some vibration at the beginning of [t] resulting from the fact that [t] is preceded by a voiced [n] sound, in which case the vocal folds are already vibrating and this vibration continues up till the beginning of [t] closure but does not continue for a long time through the closure.



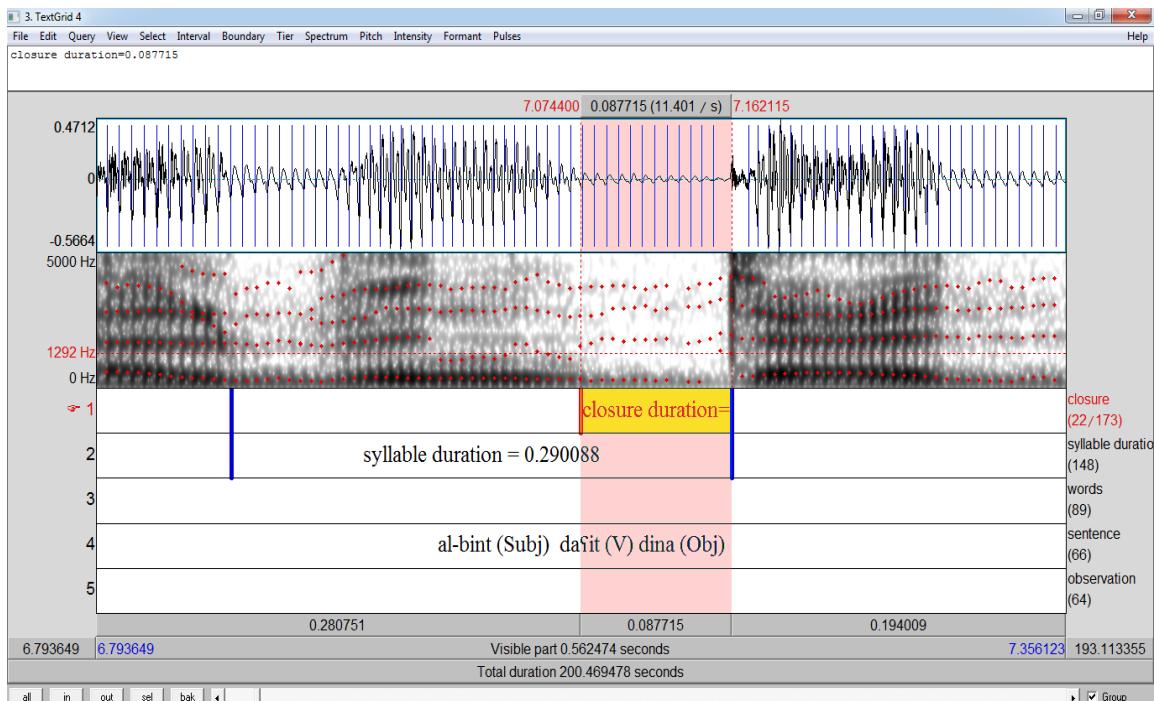
**Waveform 2:** *al-bint* pronounced in the context of *imaan*(*Subj*) *nawalat*(*V*) *al-bint*(*Obj*) *diftaar*(*Obj*) illustrating the case where [t] at the end of the first word does not assimilate voice from initial [d] in the following word. This process is made clearer in the following waveform which zooms in the closure portion of this waveform.



This waveform is a portion of waveform 2 above showing a closer view of the closure. As it is shown, the second part of the closure, especially towards the end, exhibits small vibrations reflected in the spectrogram as a fade voicing bar at its bottom and this second part of the closure corresponds to initial [d] of the following word *diftaar*. The observation that the vibrations for [d] start towards the end of the closure is supported by facts from English as it is indicated that in English voiced stops as [d], vocal fold vibration begins in the last portion of the compression stage if they occur in initial position(i.e., partially devoiced in initial position). The first part of the closure, on the other hand, corresponds to final [t] of the preceding word *al-bint*, which undergoes no assimilation of voice from following [d]. As it is shown in the waveform, there is some vibration at the beginning of [t]. However, this vibration results from the fact that [t] is preceded by a voiced [n] sound, in which case the vocal folds are already vibrating and this vibration continues up till the beginning of [t] closure but it does not continue for a long time.



**Waveform 3:** *al-bint* pronounced in the context of *al-bint(Subj) da ſit(V) dina(Obj)* illustrating the case of fully voiced assimilated [dd]. As it is demonstrated by the waveform, the wave vibration goes throughout the closure and this vibration is made clearer by the pulses (blue vertical lines) shown over the wave. These pulses represent the vibrations of the vocal folds.



This waveform is a portion of waveform 3 above exhibiting a closer view of the voicing closure.

- b. The presence vs. non-presence of a spike: This cue has not much to tell about the application/non-application of assimilation. The spike, indicating the burst of noise when the stop closure is released, is only observed when [t] is the final sound in the word pronounced in isolation. In the case where [t] is the final sound in a word and is followed by a word beginning with [d], [t] is not released whether it undergoes assimilation or not. There is only one release after the closure of the [d] of the second word and this release shows no real spike at the beginning, just a somewhat irregular waveform before the start of the following vowel.
- 2- Visualizing the spectrogram: As it is indicated above, voicing vibration seen in the waveform is signaled in the spectrogram as a *band* of energy or voicing bar (at the bottom of the spectrogram). Considering the waveforms above and their spectrograms, it is made clear that whenever the waveform exhibits vibration of vocal cords, the spectrogram reflects this vibration as a faint bar at its bottom.
- 3- Quantitative contrast: The following durational cues are used to reinforce the waveform and spectrogram evidence for the application/non-application of the [t] assimilation rule.
- a- Preceding vowel length: What is observed here is that the length of the vowel before the geminate [dd] is shorter than that before a voiceless [t] that undergoes no voicing assimilation. The account for this observation goes as follows. It is generally assumed that vowels are shorter before geminates (assimilated geminates) than before singletons. Although in this part, the comparison made is between singleton [t] in isolation against geminate [dd] in context<sup>202</sup> (as shown below) rather than between singleton [d] as against geminate [dd], the acoustic cue of the preceding vowel length can still be used though in a somewhat indirect way. This can be done by combining the effect of the assumption or tendency of vowels to be shorter before geminates than before singletons with another assumption related also to the role of preceding vowel duration though this time in

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<sup>202</sup> In the contexts where the [t] assimilation rule is evidenced to apply, by both the spectrogram and waveform cues discussed before.

distinguishing between voiced and voiceless singleton consonants. These two tendencies are defined below.

- I. First tendency: Vowels are shorter before voiceless consonants than before voiced consonants (Ladefoged, 2001).
- II. Second tendency: Vowels are shorter before geminates (assimilated geminates) than before singletons (Ridouane, 2010)

Reading the first tendency, one expects that the vowel before voiced [d] is longer than that before [t] contrary to facts. However, taking into account the second tendency, the facts somehow fall into place. What is found is that a vowel preceding a voiced geminate [dd] is shorter than that preceding a voiceless singleton [t]. This surely indicates that [t] assimilates to [d], because if [t] does not undergo assimilation, then we should find no difference in the duration of the vowel preceding it both in isolation and in context. However, and as it is indicated in the table below, the length of the last vowel in a word as *mirfat* is longer when the word is pronounced in isolation than when it is pronounced in context indicating that [t] is assimilated to [d]. The following table summarizes the length of the vowel in the words *mirfat* and *da ŋit* both in isolation and in the context of the sentence *mirfat (Subj) da ŋit (V) do ŋa (Obj)*.

**Table (2)**

Word	Environment	Preceding vowel duration (milliseconds)
<b>1-mirfat</b>	1-In Context (Subj): <i>I.Repetition 1:</i>	0.055314
		0.056042
		0.056829
	2- In isolation: <i>I.Repetition 1:</i>	0.075907
		0.102413
<b>2- da ŋit</b>	1-In Context (Verb): <i>I.Repetition 1:</i>	0.047273
		0.039104
		0.045558
	2- In isolation: <i>I.Repetition 1:</i>	0.063411
		0.071160

b. Closure duration:

As it is indicated earlier, closure duration is documented to be larger for voiceless stops than for voiced ones. It is used here as a re-enforcing factor to emphasize whether assimilation takes place or not. This cue is used here to contrast the contexts where [t] assimilation appears to apply across words as opposed to the contexts where it does not seem to apply across word boundaries.

This cue is also used here in an indirect way. The idea here is that if assimilation takes place then the closure will be for a voiced geminate [dd]; however, if assimilation does not take place then the closure is for both voiceless unexploded [t] plus a voiced [d]. Thus, the expectation here is that the closure duration for assimilated voiced geminate [dd] will be shorter than that for voiceless singleton [t] + voiced singleton [d] and this expectation is borne out as the following two tables show. The first table below shows the duration of the closure in the context where the subject ends in [t] and the verb begins in [d]. The second table below shows the duration of the closure in the context where the indirect object ends in [t] and the direct object begins in [d].

Comparing the two tables below, what we see is that when assimilation takes place resulting in [dd], evidenced by both the waveform and spectrogram, then the duration of the closure tends to be shorter than the duration of the closure of the context where assimilation does not take place. All the sentences and their repetitions in the first table below as well as the last three repetitions in the second table below have shorter closure duration than the first four repetitions in the second table. The first four repetitions in the second table, and as it is evidenced by both the waveforms and spectrograms of these repetitions, do not show assimilation and this is now both reinforced and reflected by the closure duration which tend to be longer being a closure of both a voiceless singleton [t] + a voiced singleton [d].

**Table (3): Assimilation**

<b>Context : Between Subj &amp; Verb</b> (Subject ends in /t/and the verb begins in/d/)	<b>Realization</b>	<b>Closure duration</b>
Sentence 1: al-bint <b>dabaxat</b> daggah S V O	Voiced Geminate/dd/ <u>(assimilation )</u>	Repetition 1: 0.073070 Repetition 2: 0.093388 Repetition 3: 0.092467
Sentence 2: al-bint <b>dabaxat</b> dabiiix S V O	Voiced Geminate/dd/ <u>(assimilation )</u>	Repetition 1: 0.083405 Repetition 2: 0.075693 Repetition 3: 0.071223
Sentence 3: al-bint <b>da f</b> it do f a S V O	Voiced Geminate/dd/ <u>(assimilation )</u>	Repetition 1: 0.068538 Repetition 2: 0.071290 Repetition 3: 0.066267
Sentence 4: al-bint <b>da f</b> it dina S V O	Voiced Geminate/dd/ <u>(assimilation )</u>	Repetition 1: 0.073744 Repetition 2: 0.087715 Repetition 3: 0.075363

**Table (4): Assimilation vs. No-assimilation:**

<b>Context : Between IO &amp; DO</b> (The IO ends in /t/ and the DO begins in /d/)	<b>Relaization</b>	<b>Closure duration</b>
Sentence 1: imaan nawalat al-bint <b>diftaar</b> S V IO DO	Voiceless /t/ + voiced /d/ <u>(no assimilation)</u>	Repetition 1: <u>0.122030</u> Repetition 2: <u>0.115075</u> Repetition 3: <u>0.127148</u> Repetition 4: <u>0.134550</u>

Worth mentioning here is that the findings of the two tables above perfectly match that of the two tables for the same sentences presented in the following section, and which manipulate the phonetic cue of pre-boundary lengthening.

As for the closure duration for final released [t] in words pronounced in isolation, it will not be of much benefit to compare it with that of the same words when pronounced in context and this is due to the fact that when [t] is followed by a word beginning with a plosive, [t] is always unexploded whether it undergoes voicing assimilation or not. Hence, it is of less benefit to compare the closure duration of a singleton [t] in isolation with that of the geminate [dd] or even the unexploded [t] + [d]. However, and just for the sake of re-enforcing the fact that closure duration does really play a role in distinguishing voiceless and voiced stops, I present below a table that contrasts the closure duration of singleton [t] in the words *mirfat* and *da ŋit* when pronounced in isolation as opposed to the closure duration of geminate [dd] in the context of the sentence *mirfat* (*Subj*) *da ŋit* (*V*) *do ŋa* (*Obj*). As the table shows, the difference between the closure duration of geminate [dd] and singleton [t] is slight, validating the view assumed here that voiceless singleton [t] has a longer duration than its counterpart voiced singleton [d].

**Table (5).**

Word	Environment	Relaization	Closure duration
<b>1-mirfat</b>	1-In Context: <i>I.Repetition 1:</i>	Voiced Geminate/dd/	0.109554
		Voiced Geminate/dd/	0.108783
		Voiced Geminate/dd/	0.098540
	2- In isolation: <i>I.Repetition 1:</i>	Voiceless Sigleton/t/	00.097830
		Voiceless Sigleton/t/	0.102972
<b>2- da ŋit</b>	1-In Context: <i>I.Repetition 1:</i>	Voiced Geminate/dd/	0.109979
		Voiced Geminate/dd/	0.111810
		Voiced Geminate/dd/	0.110821
	2- In isolation <i>I.Repetition 1:</i>	Voiceless Sigleton/t/	0.087938
		Voiceless Sigleton/t/	0.103182

#### 4- Pre-boundary lengthening

In addition to the three above-mentioned cues, I also use the cue of the pre-boundary lengthening in some cases to reinforce the fact that there is a boundary at the point where assimilation fails to apply. Thus, this cue is used only in cases where the cues mentioned above denotes that assimilation does not seem to apply suggesting the existence of a boundary. I use this cue mainly in the cases where I cannot use the preceding vowel length as a cue due to the fact that some data include words with no penultimate vowel. Here, I will measure the duration of the syllable containing the undergoer [t] in milliseconds (including the whole closure up till the release). More specifically, I use this cue as a decisive variable to support the observed spectral findings of the non-application of assimilation between the indirect object *al-bint* and the direct object *diftaar* in the sentence *imaan(S) nawalat(V) al-bint(IO) diftaar(DO)* and this will finally help me to reach my goal namely defining the surface phonological phrasing pattern in San'ani.

Accordingly, the length of the last syllable *bint* in the word *al-bint* is measured (up to the beginning of release) both in the context where the assimilation rule seems to apply namely when *al-bint* is a subject and in the context where the rule does not seem to apply namely when *al-bint* is used as an indirect object. The results below show that there is a real difference between the durations of the last syllable of the same word *al-bint* depending on its syntactic context. What is noticed is that the duration of the last syllable (up till the point of release) is longer when the word is used as indirect object indicating a pre-boundary lengthening.

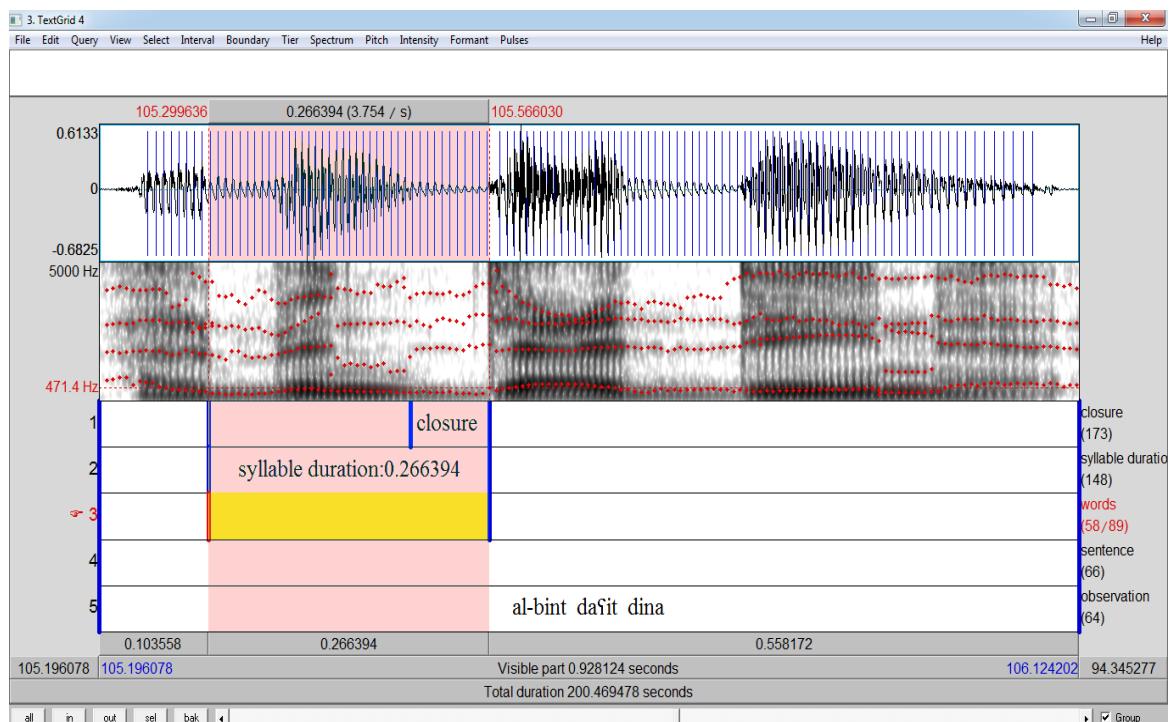
**Table (6): Duration of the syllable *bint* in phrase-initial position.**

Context	Duration of syllable when in subject position
Sentence 1: al- <b>bint</b> dabaxat daggah S V O	Repetition 1: 0.206330 Repetition 2: 0.270755 Repetition 3: 0.275692
Sentence 2: al- <b>bint</b> dabaxat dabiiix S V O	Repetition 1: 0.227100 Repetition 2: 0.215847 Repetition 3: 0.221018
Sentence 3: al- <b>bint</b> da ꝑit do ꝑa S V O	Repetition 1: 0.279334 Repetition 2: 0.252703 Repetition 3: 0.265273
Sentence 4: al- <b>bint</b> da ꝑit dina S V O	Repetition 1: 0.244552 Repetition 2: 0.290088 Repetition 3: 0.266394

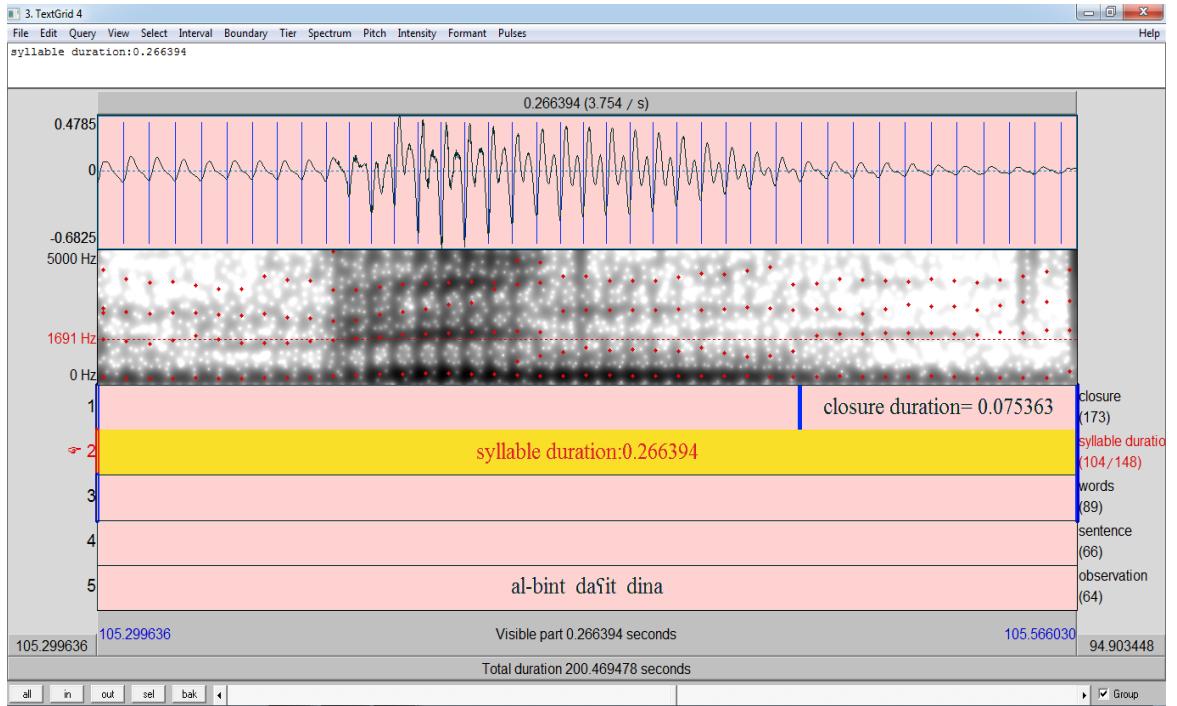
**Table (7): Duration of the syllable *bint* in the context of the sentence *imaan nawalat al-bint diftaar***

	Duration of syllable when in indirect object position
imaan nawalat al- <b>bint</b> diftaar S V O O	Repetition 1: 0.324825 Repetition 2: 0.295156 Repetition 3: 0.310578 Repetition 4: 0.352371 Repetition 5: <u>0.251663</u> Repetition 6: <u>0.233324</u> Repeition 7: <u>0.245856</u>

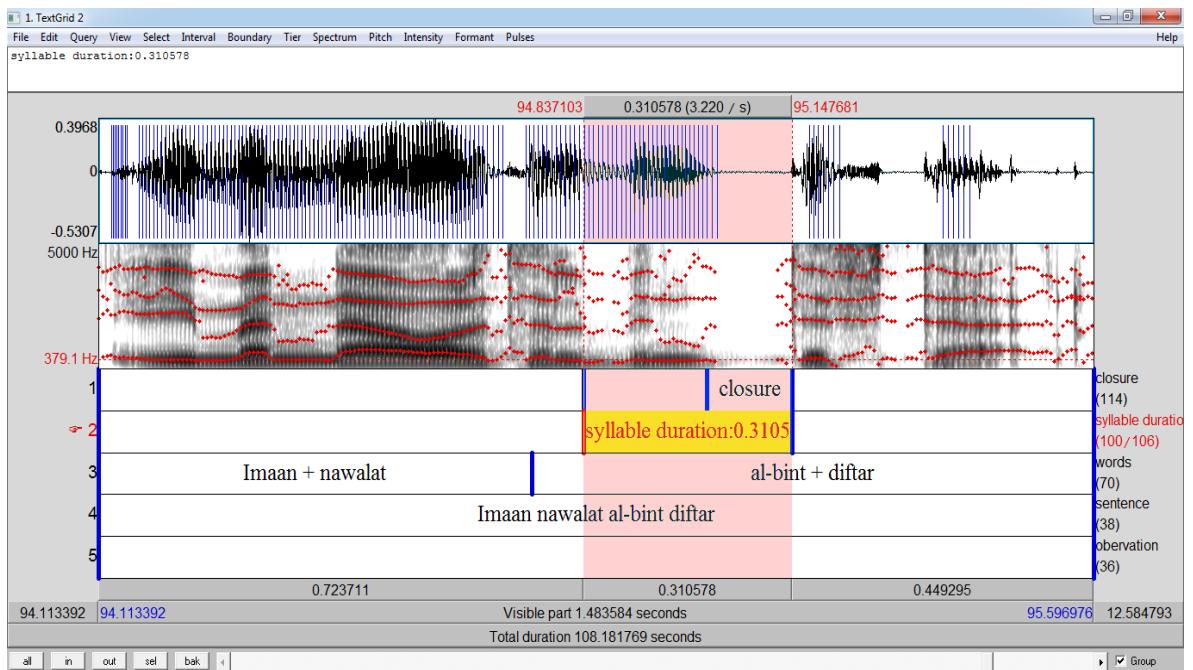
In the following, we have three waveforms with their spectrograms. The first waveform is for the sentence *al-bint (Subj) da ʕit (V) dina (Obj)* instantiating the case where the syllable *bint* has shorter duration of 0.266394 seconds. The duration of the last syllable is the number in black colour immediately above the waveform portion for the syllable. The second waveform is for the sentence *imaan (Subj) nawalat(V) al-bint(Obj) diftaar(Obj)* when pronounced in slow speech, instantiating the case where the last syllable *bint* is a pre-boundary syllable as it is denoted by its longer duration of 0.310578 seconds as compared with that of the first case. The last waveform is for the same sentence *imaan (Sub) nawalat(V) al-bint (Obj) diftaar(Obj)* as produced in rapid speech. What we notice here is that the duration of the last syllable of the word *al-bint* is shorter this time with a reading of 0.233324 seconds, suggesting the fact that there is this time no-boundary between the indirect object and the direct object. The fact that this time the direct object is phrased together with the indirect object in the sentence is also reinforced by the waveform vibration (voicing) throughout the closure. This is the case in repetitions 5, 6 and 7 of the sentence in the table above and waveform 6 below is for repetition 6.



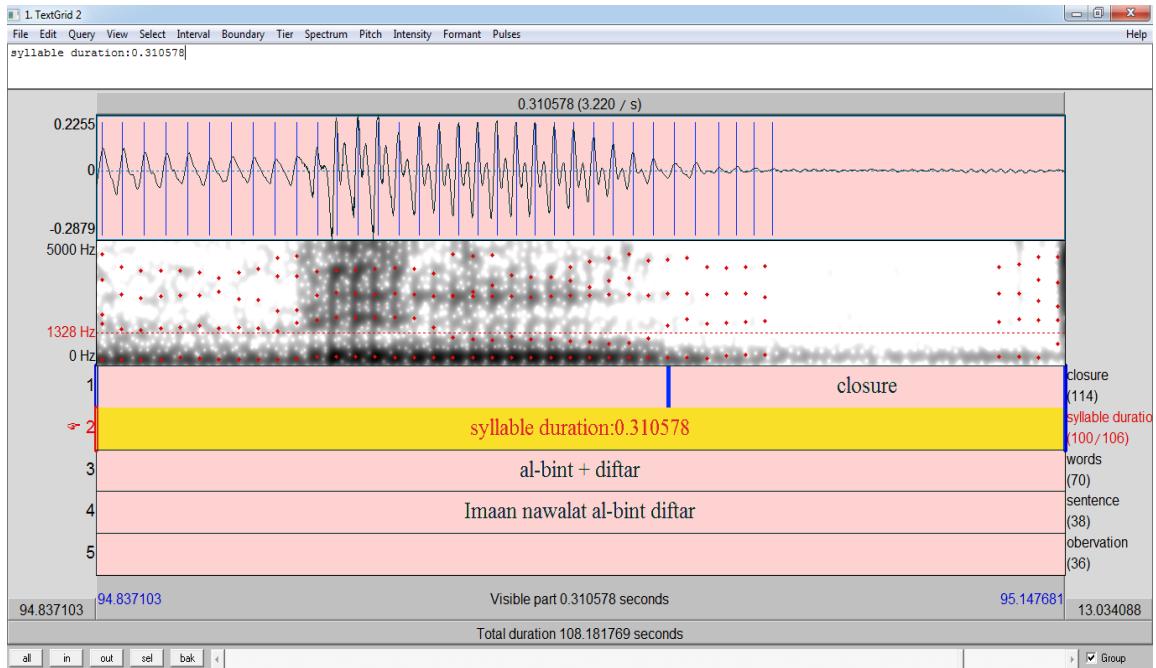
Waveform 4: The shaded portion is the waveform and spectrogram illustrating the shorter duration of the last syllable of the word *al-bint* when *al-bint* occurs in subject position in the context of *al-bint (Subj) da ʕit (V) dina (Obj)*. The duration of the syllable *bint* is the number in black colour immediately above the waveform portion for the syllable.



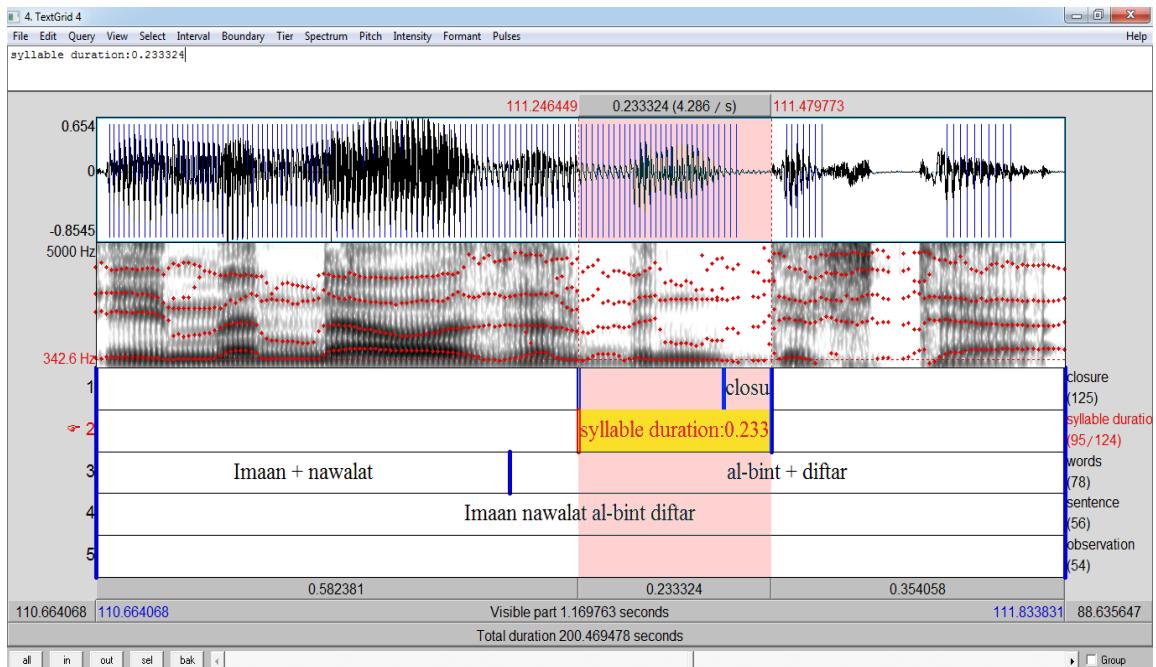
A zoom-in view of the shaded portion of waveform 4 above. As the waveform shows, the fact that there is no boundary after the word *al-bint* is suggested not only by the fact that the last syllable bint is shorter in duration but also by the fact that the [t] of the word *al-bint* undergoes voicing assimilation as it is signaled by the voicing vibration throughout the closure.



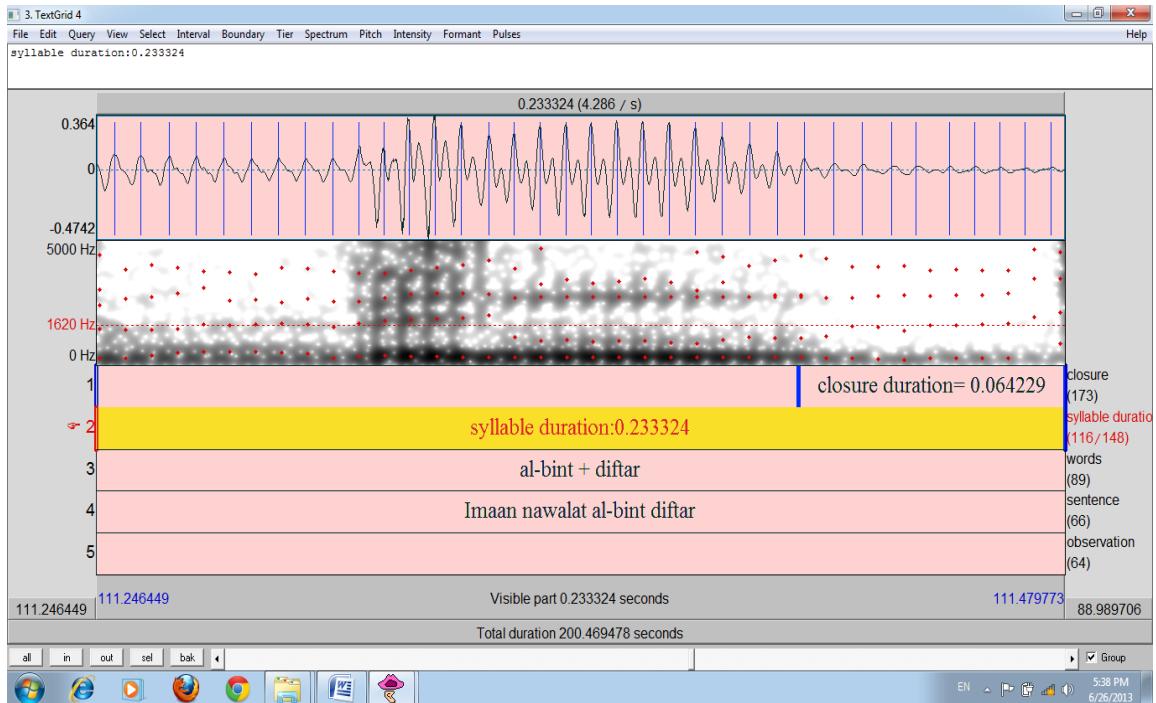
Waveform 5: The shaded portion is the waveform and spectrogram illustrating the longer duration of the last syllable of the word *al-bint* when *al-bint* occurs in indirect object position in the context *Imaan* (*Subj*) *nawalat*(*V*) *al-bint*(*Obj*) *diftaar*(*Obj*). The duration of the syllable *bint* is the number in black colour immediately above the waveform portion for the syllable.



A zoom-in view of the shaded portion of waveform 5 concentrating on both the closure and the duration of the syllable *bint*. As it can be seen from the waveform, the fact that there is a boundary after the word *al-bint* is signaled not only by the fact that the last syllable *bint* is longer here but also by the fact that the [t] of the word *al-bint* does not undergo voicing assimilation as it is denoted by the lack of vibration through the first half of the closure. The initial vibration in the closure is, however, due to the fact that [t] is preceded by a voiced [n] sound whose voicing continues up till the beginning of [t] closure though it does not continue for a long time.



Waveform 6: The shaded portion is the waveform and spectrogram illustrating the shorter duration of the last syllable of the word *al-bint* when *al-bint* occurs in indirect object position in the context *Imaan* (*Subj*) *nawalat*(*V*) *al-bint*(*Obj*) *diftaar*(*Obj*).



A zoom-in portion of waveform 6 concentrating on both the closure and the duration of the syllable *bint*. As the waveform shows, the fact that there is no boundary after the word *al-bint* is suggested by both the shorter duration of the last syllable of the word *al-bint* as well as by the fact that the [t] of the word *al-bint* undergoes voicing assimilation as it is demonstrated by the voicing vibration throughout the closure.

To conclude, this section empirically gives us evidence to support the view that the durational and external sandhi phenomena can be regulated by the same prosodic structure<sup>203</sup>. As we have seen, the same phonological phrasing pattern is predicted by both the phonological rule of [t] assimilation and the durational effects. More specifically, the durational cues either 1- support the application/non-application of the [t] assimilation rule, a role played by both closure duration and preceding vowel deletion or 2- predict a boundary exactly at the same point where the rule does not seem to apply, a role played by the pre-boundary lengthening cue to phonological phrasing.

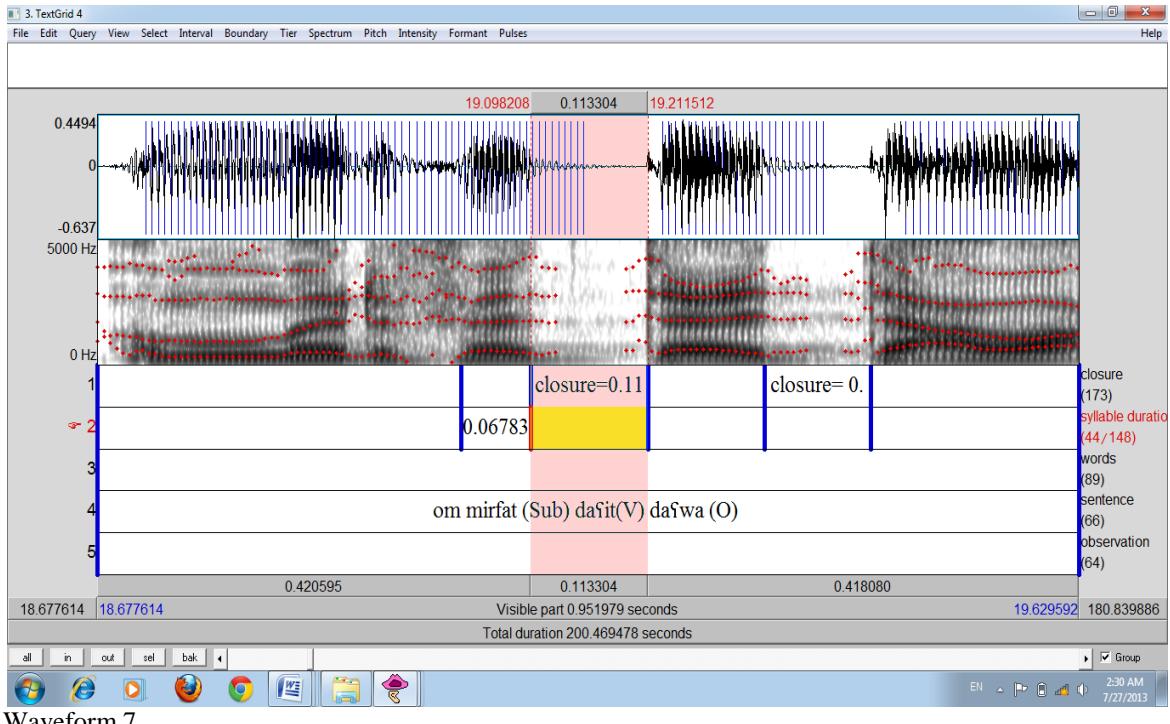
### 6.3.3.2 Discussion and Results 2: Phrasing Pattern/s

1-What is noticed is that SVO sentences in San’ani tend to be included in one single MaP and this is signaled by both the application of /t/ assimilation rule as well as by the durational effects. Thus, the dominant phrasing for SVO sentences is (SVO)φ. This phrasing pattern emerges as the optimal not only in cases of simple SVO sentences with

<sup>203</sup> See Evia Kainada (2006) for discussion.

subject, verb and object all consisting of one phonological word but even in the cases where the subject is a complex one consisting of two or even four phonological words<sup>204</sup>.

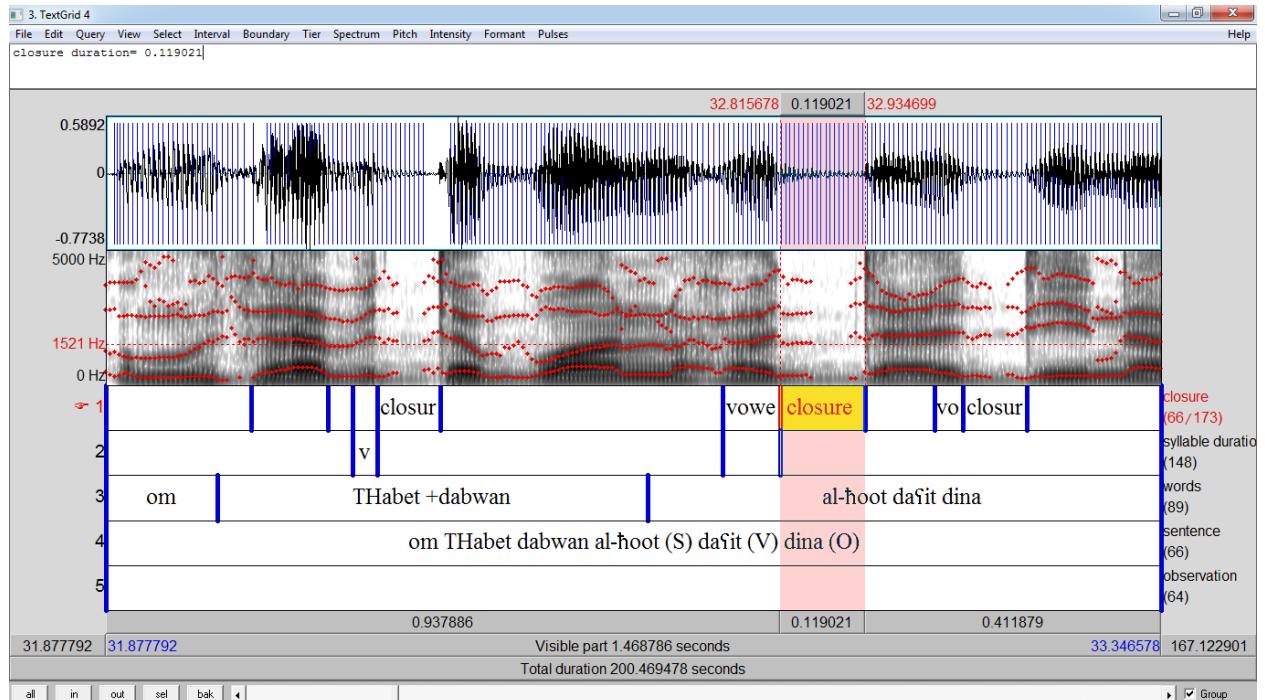
The following waveform and spectrogram is for the sentence *om mirfat (Subj) da ꝩit (V) da ꝩwa(Obj)* instantiating the case where the subject consists of two words. Voicing assimilation is signaled by both the wave vibration and the voicing bar at the bottom of the spectrogram.



Waveform 8 (and its spectrogram) below makes it clear that a four-word subject is still phrased together with the verb and object. Observing the second closure of the waveform 8, we notice a voicing throughout the closure signaled by both the voicing bar and the voicing vibration in the waveform.

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<sup>204</sup> It will be suggested later that the relevant phonological factor is perhaps Selkirk's (2000) Binary Minimum (MaP).



Waveform 8.

In addition to the wave and spectrogram evidence present above, the following table compares two durational cues for the words (environments) in question both in isolation and in context.

**Table (8).**

The case of a four-word subject: <u>om THabet dabwan al-hoot</u> <u>daʃit</u> <u>dina</u>				
		S	V	O
Word	Environment	Preceding vowel duration (milliseconds)		Closure duration
<b>1- THabet</b> (+dabwan)	1-In Context Between 2 words within the subject	0.033900		0.087561
	2- In isolation	0.094314		0.072677
<b>2- al- hoot</b> (+ daʃit)	1-In Context Between the subject and the verb	0.079866		0.119021
	2- In isolation	0.130967		0.063412
<b>3- daʃit</b> (+dina)	1-In Context Between the verb & the object	0.040567		0.088110
	2- In isolation	0.071160		0.103182

2- The dominant p-phrasing in San'ani is always (SVO) $\phi$  disregarding speech rate viz the phrasing (SVO) $\phi$  is the optimal one at both slow and rapid speech rates<sup>205</sup>.

3- The fact that the phrasing pattern in San'ani wraps the whole SVO sentence onto a single domain makes it difficult to decide whether the level being cued is the MaP or the intonational phrase (IP) and this is due to the fact that prosodic IPs are generally defined in relation to syntactic CPs. Since the emerging phrasing is (SVO), a domain that exhausts the whole content of the CP, it becomes unclear whether the level being cued is the MaP level or the IP one. However, the fact that the level being cued is still the MaP level comes from extra data from di-transitives. More specifically, the extra data consist of seven repetitions of the sentence *imaan (Subj) nawalat(V) al-bint(IO) diftaar(DO.)* The phrasing that emerges for (the repetitions of) the di-transitive sentence in slow speech rate is (SVO) $\phi$  (O) $\phi$ <sup>206</sup> and the boundary immediately after the indirect object is defined by taking into account all the variables discussed in the previous section, namely the /t/ assimilation rule and the durational cues. This undoubtedly suggests that the level in question is the MaP. More specifically, table (9) below summarizes the results of the comparison made earlier in this chapter between the duration of the syllable *bint* when it occurs in subject position as opposed to the case when it occurs in indirect object position (see tables 6 &7 above). As the table below shows, the duration of the last syllable in the word *al-bint* is longer when it occurs in the indirect object position in the first four repetitions than when it occurs in the subject position suggesting the existence of a

<sup>205</sup> As for the di-transitive repetitions, two phrasing patterns emerge: the first is (SVO) $\phi$  (O) $\phi$  at slow speech rate and the second is (SVOO) $\phi$  at fast(er) speech rate.

<sup>206</sup> It is notable to indicate that the observed phonological facts in double object constructions in San'ani namely the (SVO) $\phi$  (O) $\phi$  p-phrasing pattern, supports an analysis of San'ani Arabic as an asymmetric one. Seidl (2001) indicates that asymmetric languages have a phonological phrasing of the type (S V NP) $\phi$  (NP) $\phi$ . Samuels (2009) derives the basic phrasing for asymmetric languages assumed in Seidl (2001) within a spell-out-based framework. Following McGinnis (2001), Samuels (2009) indicates that the phrasing (V IO) $\phi$  (DO) $\phi$  in asymmetric languages follows from spell-out domains once we take into account the difference between symmetric languages and asymmetric ones namely that the former have a high applicative (ApplHP) between vP and VP, while the latter have a low applicative (ApplLP) within VP and that a high applicative head is a phase head but not the low applicative head. A related point to mention here is that it has been demonstrated in some studies as An-nashef (2013) that the double object construction pattern of MSA exhibits low applicative properties as it satisfies the main diagnostic tests for low applicatives proposed by Pylkkänen (2002, 2008).

boundary in the first case. However, the phrasing (SVOO) $\phi$  is also observed for this ditransitive sentence and it emerges in fast speech as it is illustrated by the last three repetitions 5, 6 and 7 in the table below. In these three repetitions, the duration of the syllable *bint* is shorter than that in the first 4 repetitions pronounced in a slow speech rate, suggesting the absence of a boundary in these three repetitions<sup>207</sup> viz repetitions 5, 6 and 7.

**Table (9)**

Word	Duration of the syllable <i>bint</i> when the word <i>al-bint</i> occurs as a subject	Duration of the syllable <i>bint</i> when the word <i>al-bint</i> occurs as an indirect object
<b>al-bint</b>	0.206330 0.270755 0.227100 0.215847 0.279334 0.252703 0.244552 0.266394 0.265273 0.290088	Repetition 1: 0.324825 Repetition 2: 0.295156 Repetition 3: 0.310578 Repetition 4: 0.352371  Repetition <u>5: 0.251663</u> Repetition <u>6: 0.233324</u> Repetition 7: <u>0.245856</u>

4- As it is indicated above, the emerging phrasing for SVO sentences in San'ani is (SVO) $\phi$ . This type of phrasing cannot be predicted or accounted for within an OT-based account as that of the end-based and this is due to the fact that both Align-XP,R and Align-XP,L predict that the subject is always phrased separately. The end-based can account for this type of phrasing only by taking into account the role of phonological factors of weight.

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<sup>207</sup> Considering table(9), the duration of the syllable *bint* in the last three repetitions fall within the same limits that the same syllable has when it occurs in subject position and this is clear when one compares context 5, 6 and 7 in the indirect object column with that of the subject column.

### 6.3.4 Different Accounts of the Observed Phonological Phrasing Patterns

#### 6.3.4.1 Two Possible Spell-out-Based Accounts of the (SVO) $\phi$ Phrasing Pattern

In this part, I am going to develop two possible spell-out-based accounts of the observed (SVO) $\phi$  phrasing pattern, evidenced by both phonological and durational cues to phrasing.

##### 6.3.4.1.1 First Possible Spell-out-Based Account

First possible spell-out-based account: As it has been indicated above, the prominent phrasing for SVO sentences in San'ani is (SVO) $\phi$ . The account I develop below is a spell-out-based one. Accordingly, and as far as the spell-out mechanism proposed in this dissertation is concerned, spell-out in San'ani can be studied in relation to two aspects.

###### a. Type of spell-out

Accordingly, the phasal head  $v^*$  includes the instruction that its domain (verb plus object) be defined onto a single domain (VO). Hence, spell-out on the  $v^*P$  phase is delayed via PIC2 ensuring head movement<sup>208</sup>. Thus, the fate of the verb and object will be finally determined when C enters the scene. C, in San'ani, is assumed here to have a strong wrapping instruction which results in the subject, verb and object being spelled-out together onto a single domain  $\phi$ , overriding the instruction of the lower phase to define the verb and direct object as a single domain  $\phi$ .

###### b. Timing of spell-out

As it is indicated above, spell-out is assumed to occur via PIC2 to allow head movement to take place. Hence, the prediction here is that the delay of spell-out via PIC2 can allow phonological considerations of weight to come into effect (especially in faster speech rates).

- ✓ Resulting phrasing: (SVO) $\phi$

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<sup>208</sup> The verb movement to T/Infl.

The spell-out-based account discussed above is considerably supported by the following points:

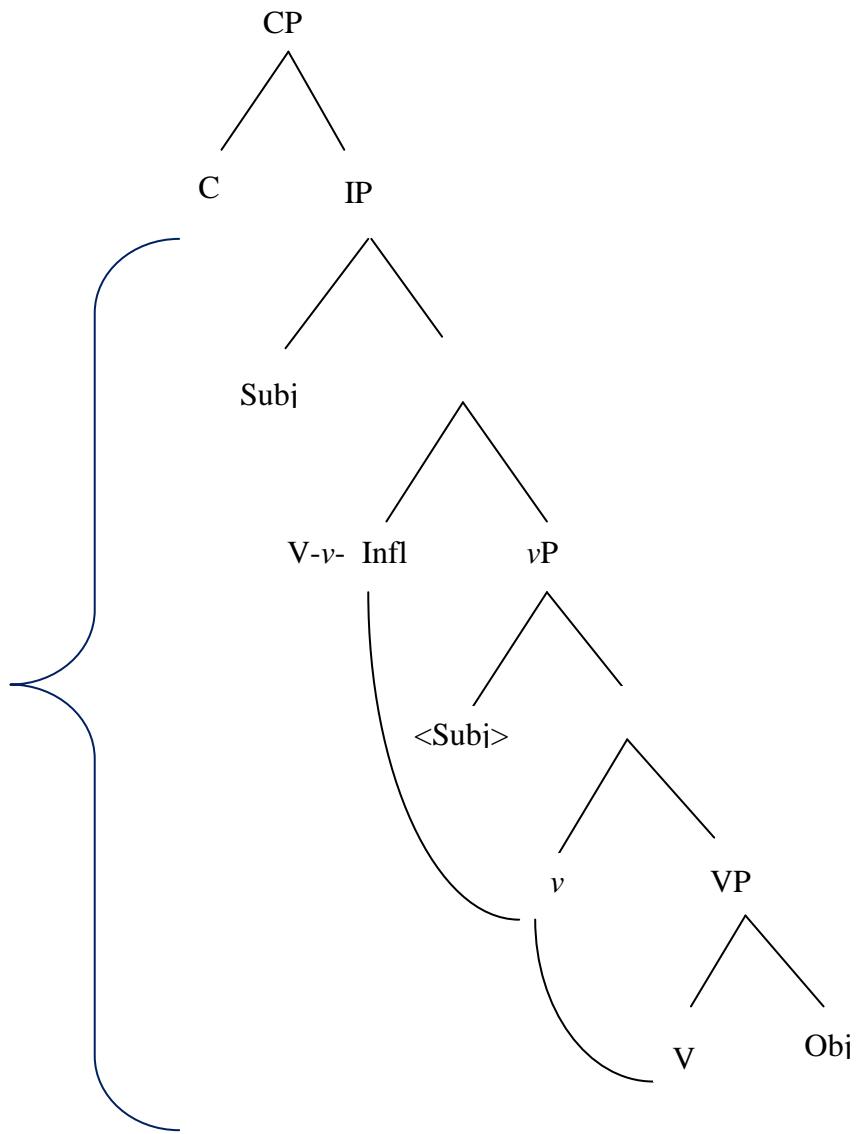
- a) Observed phonological facts in San'ani: The phrasing type (SVO) $\phi$  is the only observed phonological pattern at both slow and fast speech rates and disregarding the complexity of the subject<sup>209</sup>.
- b) The p-phrasing type (SVO) $\phi$  is observed in other languages as Xhosa (see Zerbian, 2004 for discussion).
- c) Even if the phrasing (SVO) $\phi$  turns out to be the result of phonological considerations of weight, or perhaps a one favored by both interface constraints and phonological ones, it is the delay of spell-out via PIC2, incorporating more structure, that allows phonological considerations to come into play.
- d) The assumption above that there is only one instance of spell-out applying to the whole domain of C resulting in the phrasing (SVO) $\phi$ <sup>210</sup> is supported by the assumption adopted by some linguists that only CP is considered a phase.
- e) The account above is a superior one in that it helps us to attain a direct reference account of the p-phrasing (SVO) $\phi$ , that is, the p-phrasing (SVO) $\phi$  is assumed here to result from the spell-out mechanism itself<sup>211</sup> supporting the strong minimalist thesis that spell-out domains are the only domains that phonology needs (Samuels, 2009).

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<sup>209</sup> The subject is always phrased with the verb and object disregarding whether it consists of one word, two words or even four words.

<sup>210</sup> This assumption is true as far as the SVO structure is concerned. However, in di-transitive sentences, there is also spell-out at the level  $v^*$  which is signaled by the DO being phrased separately from other constituents. Thus, we have two instances of spell-out rather than one. The main motivation for presenting point **d**) above is just to support the fact that a MaP can be as long as a CP (whole domain).

<sup>211</sup> Rather than resulting from the effect of phonological considerations.



**Figure (1): First Possible Spell-out-Based Account**

#### 6.3.4.1.2 Second Possible Spell-out-Based Account

However, what excludes the possibility that the emerging (SVO) $\phi$  phrasing is the result of the dominance of some highly ranked prosodic weight constraint and that the syntax-phonology defining (mapping) algorithm relevant to San'ani is not (SVO) $\phi$ . That is to say, what if the  $v^*$ 's spell-out instruction to spell-out the verb and object together is not overwritten by a strong wrapping instruction of a higher phase head C, viz C has no strong wrapping instruction in San'ani. Rather, the p-phrasing (SVO) $\phi$  emerges due to certain phonological considerations of weight. The assumed spell-out process in this case can be studied in relation to two aspects:

a) Type of spell-out

Accordingly, the phase head  $v^*$  includes the instruction that its domain (verb plus object) be defined onto a single domain (VO) $\phi$ . Hence, spell-out on the  $v^*P$  phase is delayed in ways predicted by PIC2 to ensure  $v^*$ -to-T movement. When C is merged, spell-out on the lower (slided) phase is performed resulting in the verb and direct object being spelled-out together onto a single domain  $\phi$ . As regards the subject, it will be spelled-out onto a separate  $\phi$  within the domain of the phase C.

b) Timing of spell-out

Spell-out is assumed to occur via PIC2, which ensures head movement to T to take place.

✓ Resulting phrasing: (S) $\phi$  (VO) $\phi$

Thus, we have derivationally attained above the phrasing (S) $\phi$  (VO) $\phi$ . However, the observed surface phonological phrasing in San'ani is (SVO) $\phi$ , a phrasing pattern established by both phonological and durational evidence. As indicated above, this p-phrasing can be accounted for as resulting from the effects of phonological considerations of weight. Different accounts have been proposed in literature to account for the way phonological weight and rate of speech can affect phonological phrasing. One account assumes that these phonological factors can affect phonological phrasing through restructuring and another one accounts for the effects of

phonological factors on phrasing as resulting from a process of re-ranking and this account is called the OT-based account<sup>212</sup>.

- i. Through restructuring (Nespor & Vogel, 1986; Dobashi, 2004):

Accordingly, (SVO)φ can result from the restructuring of (S)φ (VO)φ. It will be shown later that the phonological factor of weight relevant for San'ani is *Binary Minimum(MaP)* (Selkirk, 2000). Thus, it may be the case that the p-phrase (VO)φ, containing only two prosodic words, restructures into the preceding p-phrase (S)φ resulting in a p-phrase containing the subject, verb and object.

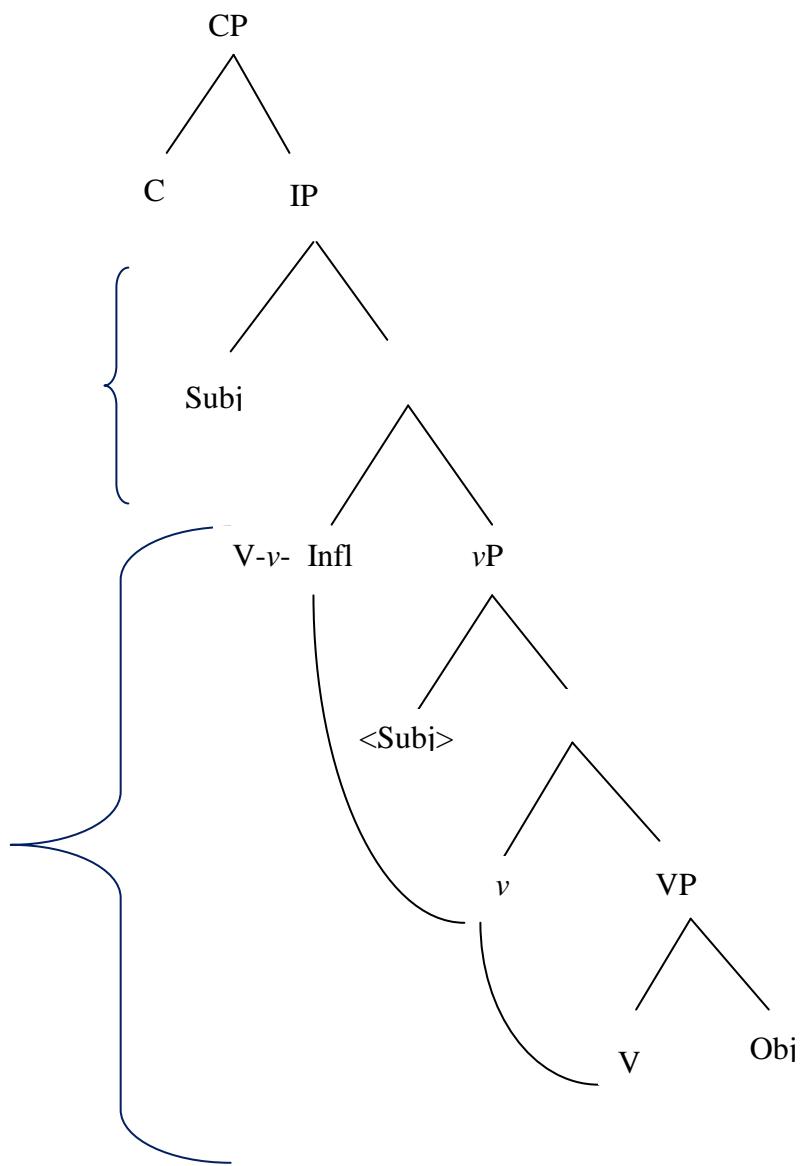
(S)φ (VO)φ ----> (SVO)φ

- ii. Through re-ranking (end-based theories): OT-based account

Accordingly, ranking the weight constraint *Binary Minimum (MaP)* higher than interface mapping (constraint/s) can predict the phrasing (SVO)φ. This is the account to be employed later when handling the OT-based account.

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<sup>212</sup> There is, however, a third possible account which assumes that the phonological factors can be a part of the mapping itself. Both Zec and Inkelas (1990) and Guasti and Nespor (1999) assume that phonological considerations of weight can be part of the mapping. However, while Zec and Inkelas (1990) assumes that both syntax and phonology are co-present and thus the interface processes information flowing in both directions: from syntax into phonology and from phonology into syntax, Guasti and Nespor (1999) assumes that the influence of phonology on syntax is limited to interface requirements, more specifically, the part of phonology that may influence syntax is that of weight considerations as well as focus and rhythm.



**Figure (2): Second Possible Spell-out-Based Account**

### 6.3.4.2 OT-based Accounts

#### 6.3.4.2.1 Two Constraint-Based OT Accounts of Major Phonological Phrasing in SVO Sentences

The two OT accounts to be developed here are but the mirrors of the spell-out-based accounts developed earlier in this chapter, and they can even be used to attest the predictions of the spell-out-based accounts. The two OT accounts will be discussed below in detail. The following constraints are all the constraints to be used within the two OT accounts discussed below.

##### A-Possible Interface constraints

- i.  $(SVC_1)\phi$ : Define (wrap) the domain of a phase head C onto a single  $\phi$
- ii.  $(Complex)\phi$ : Define (complex) phrases onto their own separate  $\phi$ s (to the exclusion of any other material)
- iii.  $(VC_1)\phi^{213}$ : Define the verb and its first complement together onto a single  $\phi$ .

##### B-Phonological constraint/s

Selkirk (2000) defines 3 prosodic constraints regulating the size of a MaP. Accordingly, a MaP can consist of *exactly/ at least/ at most* two minor/accidental phrases. However, MaPs can also be defined in terms of word-counting and since it is not clear whether the minor/accidental phrase exists in San'ani or not, as there is not any study dedicated to this aspect, I will assume here that MaPs in San'ani are sensitive to word-counting. Worth mentioning here is that it has been indicated in literature that MaPs can include two content words in average<sup>214</sup>, ranging from one to four content words (see Jun, 2005). Thus, I assume that the phonological constraint relevant here is Selkirk's (2000) Binary Minimum (MaP), and once we add word counting to its algorithm, the constraint can be read as follows:

- i. *Binary Minimum (MaP)*: A major phrase must consist of at least two minor/accidental phrases or prosodic (content) words.

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<sup>213</sup>  $(VC_1)\phi$  or  $v^*$  Part<sub>(Max)</sub> constraint.

<sup>214</sup> Uniformity and average weight (Ghini, 1993):

A string is ideally parsed into same length units; the average weight of the  $\phi$ s depends on tempo: at an average rate of speech, a  $\phi$  contains two phonological words; the number of phonological words within a  $\phi$  increases or decreases by speeding up or slowing down the rate of speech.

#### 6.3.4.2.1.1 First Possible OT Account

In this OT account, I assume, in line with the first spell-out-based account discussed above, that the main dominant interface constraint is  $(SVC_1)\phi$  and thus the OT grammar in this account consists of the following two sets:

##### A- Interface constraint

$(VC_1)\phi$  is the spell-out instruction of  $v^*$  and the phrasing pattern predicted by  $(VC_1)\phi$  is the same as that predicted by Align-XP,R which is assumed to be in effect in right-branching languages (dialects) as San'ani. However,  $v^*$ 's spell-out instruction viz  $(VC_1)\phi$  is overridden by the higher spell-out instruction  $(SVC_1)\phi$  of C. This can be explained in OT terms by ranking the constraint  $(SVC_1)\phi$  higher than  $(VC_1)\phi$  which means that the constraint  $(SVC_1)\phi$  is the dominant one.

- i.  $(SVC_1)\phi$
- ii.  $(VC_1)\phi$

##### B- Phonological constraint(s)

- iii. *Binary Minimum (MaP)*: A major phrase must consist of at least two minor/accidental phrases or prosodic (content) words.

To define the actual ranking between the constraints *Binary Min (MaP)* and  $(SVC_1)\phi$  in San'ani, I will attempt here 3 different rankings.

- **Case 1: *Binary Min (MaP)* and  $(SVC_1)\phi$  are same-ranked**

Consider the following tableaus.

*Tableau (1): (Subject consisting of 1 prosodic word)*

al-bint da ꝑit do ꝑa	Binary Min (MaP)	$(SVC_1)\phi$	$(VC_1)\phi$
S V O			
☞ a. (SVO) $\phi$			*
b. (S) $\phi$ (VO) $\phi$	*	*	
c. (SV) $\phi$ (O) $\phi$	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	***	*	*

*Tableau (2): (Subject consisting of 4 prosodic words)*

om Thabet dabwan al- hoot da ꝑit dina	Binary Min (MaP)	$(SVC_1)\phi$	$(VC_1)\phi$
S V O			
☞ a. (SVO) $\phi$			*
b. (S) $\phi$ (VO) $\phi$		*	
c. (SV) $\phi$ (O) $\phi$	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	**	*	*

As it is made clear by the tableaus above, the ranking above with the two constraints *Binary Min (MaP)* and  $(SVC_1)\phi$  being same-ranked helps us to account for the fact that whole SVO sentences are always wrapped onto single p-phrases (even when the number of content words in these sentences reaches 6 content words) with no variability, as no break after the subject or the verb is ever detected.

- Case 2: ***Binary Min (MaP)*** is ranked higher than ***(SVC<sub>1</sub>)φ***

*Tableau (3): (Subject consisting of 1 prosodic word)*

<u>al-bint</u> <u>da</u> <u>it</u> <u>do</u> <u>a</u> S V O	<i>Binary Min (MaP)</i>	<i>(SVC<sub>1</sub>)φ</i>	<i>(VC<sub>1</sub>)φ</i>
☞ a. (SVO)φ			*
b. (S)φ (VO)φ	*	*	
c. (SV)φ (O)φ	*	*	*
d. (S)φ (V)φ (O)φ	***	*	*

*Tableau (4): (Subject consisting of 4 prosodic words)*

<u>om Thabet dabwan al- hoot</u> <u>da</u> <u>it</u> <u>dina</u> S                                  V O	<i>Binary Min (MaP)</i>	<i>(SVC<sub>1</sub>)φ</i>	<i>(VC<sub>1</sub>)φ</i>
☞ a. (SVO)φ			*
b. (S)φ (VO)φ		*	
c. (SV)φ (O)φ	*	*	*
d. (S)φ (V)φ (O)φ	**	*	*

- Case 3: ***(SVC<sub>1</sub>)φ*** is ranked higher than ***Binary Min (MaP)***

*Tableau (5): (Subject consisting of 1 prosodic word)*

<u>al-bint</u> <u>da</u> <u>it</u> <u>do</u> <u>a</u> S V O	<i>(SVC<sub>1</sub>)φ</i>	<i>(VC<sub>1</sub>)φ</i>	<i>Binary Min (MaP)</i>
☞ a. (SVO) φ		*	
b. (S)φ (VO)φ	*		*
c. (SV)φ (O) φ	*	*	*
d. (S)φ (V) φ (O)φ	*	*	***

*Tableau (6): (Subject consisting of 4 prosodic words)*

om Thabet dabwan al- hoot	da ŋit	dina	$(SVC_1)\phi$	$(VC_1)\phi$	<i>Binary Min (MaP)</i>
S	V	O			
☞ a. (SVO) $\phi$			*		
b. (S) $\phi$ (VO) $\phi$		*			
c. (SV) $\phi$ (O) $\phi$	*		*	*	
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	*		*		**

What cases 2 and 3 above indicate is that whether we rank *Binary Min (MaP)* higher than  $(SVC_1)\phi$  or we rank  $(SVC_1)\phi$  higher than *Binary Min (MaP)*, the observed (SVO) $\phi$  phrasing pattern still emerges as the optimal one.

To sum up, and as far as the 3 cases mentioned above are concerned, there are two main observations to highlight:

1-What we conclude here is that the ranking of the constraints  $(SVC_1)\phi$  and *Binary Min (MaP)* in relation to each other is not a clear-cut issue: whether we rank one of the constraints higher than the other or we leave them samely-ranked with respect to each other, the observed phrasing (SVO) $\phi$  always emerges as the optimal, at least for the available data.

2- The second observation here is that while the constraint  $(SVC_1)\phi^{215}$  is by itself sufficient to account for the observed phrasing pattern, the constraint *Binary Min (MaP)* is not sufficient in itself to account for the attested phrasing. To put it in more simple words, if we consider a case study where the observed phonological phrasing pattern is accounted for in relation only to the constraint  $(SVC_1)\phi$ , we will still get the right

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<sup>215</sup> Worth mentioning here is that the constraint \*P-Phrase which militates against p-phrases altogether can be used here to replace the constraint  $(SVC_1)\phi$  in all the tableaus used in the three cases discussed above and we will still get the right candidate (See also footnote 218). However, the existence of the interface constraint  $(SVC_1)\phi$  has been argued for in the first spell-out-based account. \*P-Phrase, on the other hand, is a general constraint and not an interface one. On top of this, depending on data from di-transitives, it will be demonstrated towards the end of this chapter that a constraint system including the constraint  $(SVC_1)\phi$  will succeed in accounting for observed phrasing patterns in di-transitives, while a one employing \*P-Phrase as the dominant, instead of  $(SVC_1)\phi$ , will not.

candidate and you can go back to the tableaus above and check it out. This in a way supports the existence of the interface constraint  $(SVC_1)\phi$ . On the other hand, if we consider an account that relies only on *Binary Min (MaP)*, we will find, by reviewing the tableaus above, that the observed optimal candidate cannot always be attained. Thus, we can conclude that, and as far as the available data is concerned, the facts above support a conception of San'ani phrasing based on interface (faithfulness) constraints alone rather than one based on phonological weight constraints alone. This, however, does not necessarily entail that phonological weight has no role to play in San'ani.

- ✓ *Indication 1: The constraint  $(SVC_1)\phi$  plays a role in determining surface phonological phrasing in San'ani*

#### 6.3.4.2.1.2 Second Possible OT Account

This is not the end of the story. As it has been suggested by the second spell-out-based account, it could be the story that *v*'s instruction to define the verb and its DO onto a single domain  $(VO)\phi$  is not overwritten by a strong wrapping instruction of C, but is rather obscured by phonological considerations of weight. To put it in OT terms, it may be the case that the constraint  $(SVC_1)\phi$  is not the one in effect in San'ani. The case is perhaps that the *v*'s constraint  $(VC_1)\phi$  as well as a general constraint  $(Complex_{Subj})\phi$ , entailing (full DP) subjects to be phrased separately, are the ones in effect and that their effects are completely obscured by a highly ranked constraint *Binary Min (MaP)*. That is to say, the constraints  $(Complex_{Subj})\phi$  and  $(VC_1)\phi$ , whose effect in this case amount to that of *Align-XP, R* within end-based, are the ones in play in San'ani. Worth mentioning here is that, following the conclusions of Truckenbrodt (1995), the prediction is that in right-branching languages (dialects) as San'ani Arabic, the relevant constraint should be *Align-XP, R*.

*Right-branching syntax* → *Align-φ, R* (Truckenbrodt, 1995, p. 221)

Thus, the OT grammar in this account consists of the following two sets:

**A- Interface constraints**

As it is indicated above, the two constraints to be used here are  $(Complex_{Subj})\phi$  and  $(VC_1)\phi$ . However, and as I intend a general account, I will replace the constraint  $(Complex_{Subj})\phi$  with the more general constraint  $(Complex)\phi$ .

- i.  $(Complex)\phi$
- ii.  $(VC_1)\phi$

**B- Phonological constraint**

- iii. *Binary Minimum (MaP)*: A major phrase must consist of at least two minor/accidental phrases or prosodic (content) words.

The following 3 tableaus illustrate the case where *Binary Min (MaP)* is the riding force and the relevant interface constraints are  $(VC_1)\phi$  and  $(Complex)\phi$ .

**Tableau (7): (Subject consisting of 1 prosodic word)**

al-bint da ŋit do ŋa	Binary Min (MaP)	$(VC_1)\phi$	$(Complex)\phi$
S V O			
☞ a. (SVO) $\phi$		*	**
b. (S) $\phi$ (VO) $\phi$	*		*
c. (SV) $\phi$ (O) $\phi$	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	***	*	

**Tableau (8): (Subject consisting of 2 prosodic words)**

om mirfat da ŋit da ŋwa	Binary Min (MaP)	$(VC_1)\phi$	$(Complex)\phi$
S V O			
a. (SVO) $\phi$		*	**
☞ b. (S) $\phi$ (VO) $\phi$			*
c. (SV) $\phi$ (O) $\phi$	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	**	*	

**Tableau (9): (Subject consisting of 4 prosodic words)**

om THabet dabwan al- ḥ oot <b>da</b> <b>it</b> <b>dina</b>	S V O	<i>Binary Min (MaP)</i>	$(VC_1)\phi$	$(Complex)\phi$
a. (SVO) $\phi$		*	**	
☞ b. (S) $\phi$ (VO) $\phi$			*	
c. (SV) $\phi$ (O) $\phi$	*	*	*	
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	**	*		

While the constraint system above succeeds in predicting the optimal phrasing pattern (SVO) $\phi$  for the sentence in tableau 7, it fails in predicting the same phrasing pattern (SVO) $\phi$  for the sentences in tableaus 8 and 9. As tableaus 8 and 9 make it clear, the constraint system above predicts the wrong phrasing pattern (S) $\phi$  (VO) $\phi$  as optimal<sup>216</sup>, contrary to facts. Thus, this indicates that the interface constraint  $(VC_1)\phi$ <sup>217</sup> is not the one with supremacy in San'ani as it does not help us in predicting the optimal candidate. This, however, does not mean that this constraint is not relevant; the idea is that it is not the dominant one.

There is one more thing to try it out here which may in a way reinforce the assumption that the constraint  $(SVC_1)\phi$  has a real role in determining surface phonological phrasing in San'ani. Here, I will add the constraint  $(SVC_1)\phi$ <sup>218</sup> to the three tableaus above and rank it higher than both  $(Complex)\phi$  and  $(VC_1)\phi$  though lower than *Binary Min (MaP)*. As the following tableaus make it clear, adding the constraint  $(SVC_1)\phi$  to the phrasing algorithm of San'ani helps us attain the optimal phrasing pattern, while the constraints  $(Complex)\phi$  and  $(VC_1)\phi$  alone cannot account for this optimal phrasing.

<sup>216</sup> Even if one uses the more specific constraint  $(Complex_{Subj})\phi$ , the wrong phrasing pattern (S) $\phi$  (VO) $\phi$  still emerges as the optimal, contrary to facts.

<sup>217</sup> Even if  $(VC_1)\phi$  and  $(Complex)\phi$  are same-ranked, one is still unable to predict the right candidate.

<sup>218</sup> It is notable here to indicate that using the constraint *\*P-Phrase* instead of the constraint  $(SVC_1)\phi$  here can also help us to reach the optimal phrasing in all the tableaus above (See also footnote 215 above). However, it will be shown later in this chapter, that using the constraints *\*P-Phrase*,  $(Complex)\phi$  and  $(VC_1)\phi$ , with the constraint *\*P-Phrase* being highly ranked than the other two constraints, cannot help us to account for the phrasing possibilities for the di-transitive structure.

**Tableau (10): (Subject consisting of 1 prosodic word)**

<u>al-bint</u> <u>da</u> <u>it</u> <u>do</u> <u>a</u>	<i>Binary Min</i> ( <i>MaP</i> )	$(SVC_1)\phi$	$(VC_1)\phi$	$(Complex)\phi$
S V O				
☞ a. (SVO) $\phi$			*	**
b. (S) $\phi$ (VO) $\phi$	*	*		*
c. (SV) $\phi$ (O) $\phi$	*	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	***	*	*	

**Tableau (11): (Subject consisting of 2 prosodic words)**

<u>om</u> <u>mirfat</u> <u>da</u> <u>it</u> <u>da</u> <u>wa</u>	<i>Binary Min</i> ( <i>MaP</i> )	$(SVC_1)\phi$	$(VC_1)\phi$	$(Complex)\phi$
S V O				
☞ a. (SVO) $\phi$			*	**
b. (S) $\phi$ (VO) $\phi$		*		*
c. (SV) $\phi$ (O) $\phi$	*	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	**	*	*	

**Tableau (12): (Subject consisting of 4 prosodic words)**

<u>om</u> <u>Thabet</u> <u>dabwan</u> <u>al-</u> <u>hoot</u> <u>da</u> <u>it</u> <u>dina</u>	<i>Binary</i> <i>Min (MaP)</i>	$(SVC_1)\phi$	$(VC_1)\phi$	$(Complex)\phi$
S V O				
☞ a. (SVO) $\phi$			*	**
b. (S) $\phi$ (VO) $\phi$		*		*
c. (SV) $\phi$ (O) $\phi$	*	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$	**	*	*	

What the 3 tableaus above make it clear is that only an account that includes the constraint  $(SVC_1)\phi$  can help us to predict the optimal phrasing pattern (SVO) $\phi$ . Thus, it seems that the first OT account is perhaps the right account, at least for the available data.

In a nut shell, and up till this point, what we have seen is that the role of the constraint  $(SVC_1)\phi$  proves to be vital in accounting for major phonological phrasing in San'ani

whereas the role of the two constraints (*Complex*) $\phi$  and (*V C<sub>1</sub>*) $\phi$  is at best secondary and at worst questioned. Assuming all the assumptions and facts above, we can conclude that the first OT account is perhaps the right one. The two OT accounts above help us also to attest the predictions of the two spell-out-based accounts discussed earlier in this chapter. More specifically, the success of the first OT account in predicting the right results helps us to validate the first spell-out-based account that assumes C in San'ani to have a strong wrapping instruction that overwrites v's spell-out instruction, while the failure of the second OT account in predicting the right candidates helps us to discard the second spell-out-based account which assumes C in San'ani to have no strong wrapping instruction.

- ✓ *Indication 2: The constraint (*SVC<sub>1</sub>*) $\phi$  proves to be vital in accounting for major phonological phrasing in San'ani*

#### 6.3.4.2.2 OT Account of the P-phrasing Patterns in the Di-transitive Structure

Despite the fact that this study is basically dedicated to establish the surface phonological phrasing for SVO sentences, I have also included, as I indicated before, one di-transitive sentence of the structure DP V DP DP which is repeated 7 times. As I made it clear earlier in this chapter, the data on di-transitive is mainly used to help me verify the fact that the domain in question is the MaP.

What has been indicated before is that in the repetitions of the di-transitive sentence, both (SVO) $\phi$  (O) $\phi$  and (SVOO) $\phi$  phrasing types are observed. It is noticed that the phrasing (SVO) $\phi$  (O) $\phi$  emerges only in slow speech rate and is thus assumed here to result from the interface constraints (the way spell-out occurs). On the other hand, the phrasing (SVOO) $\phi$  emerges in rapid rate of speech and is thus assumed to result from the dominance of phonological considerations.

The OT grammar assumed here to account for the two p-phrasing possibilities in di-transitives still uses the same constraints used within the first OT account employed earlier to account for mono-transitive sentences. However, one more constraint will be added to the OT algorithm of San'ani to account for the separate phrasing of the lower complement and this constraint is the general constraint (*Complex*) $\phi$ .

**A- Interface constraints**

- i.  $(SVC_1)\phi$
- ii.  $(VC_1)\phi$
- iii.  $(Complex)\phi$

**B- Phonological constraint**

- iv. *Binary Minimum (MaP)*: A major phrase must consist of at least two minor/accidental phrases or phonological (content) words.

**6.3.4.2.2 .1 Two Patterns of P-phrasing**

San'ani exhibits two patterns of phrasing in the repetitions of the di-transitive sentence, one is  $(SVO)\phi$  ( $O\phi$ ) emerging in slow speech rates and the other is  $(SVOO)\phi$  emerging in fast speech rates. The existence of languages (rules) with two types of p-phrasing depending on speech rate is documented in literature. Revithiadou and Spyropoulos (2009), for example, indicates that in Greek two patterns of phrasing are observed: One emerging in slow speech and is assumed to result from the dominance of interface algorithms in slow speech rates, and another emerging in fast speech and is believed to result from the dominance of phonological considerations in fast(er) rates of speech<sup>219</sup>. In the following, I will attempt to account for the two observed phrasing patterns for the repetitions of the sentence *imaan (Subj) nawalat(V) al-bint (IO) diftaar (DO)*.

i. Phonological phrasing in slow speech

The observed phrasing in slow speech is  $(SVO)\phi$  ( $O\phi$ ) and it can be accounted for by highly ranking the interface constraints  $(SVC_1)\phi$  and  $(VC_1)\phi$  over the prosodic weight constraint *Binary Min (MaP)*.

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<sup>219</sup> The main details of the account developed within Revithiadou and Spyropoulos (2009) is discussed in Chapter 2 of this dissertation in the section entitled *Greek: A case of optional p-phrasing*.

**Tableau (13)**

<u>Imaan nawalat al-bint diftaar</u> S      V      IO      DO	$(SV C_1)\phi$	$(VC_1)\phi$	$(Complex)\phi$	<i>Binary Min (MaP)</i>
☞ a. (SVO) $\phi$ (O) $\phi$	*	*	**	*
b. (S) $\phi$ (VO) $\phi$ (O) $\phi$	*		*	**
c. (SV) $\phi$ (O) $\phi$ (O) $\phi$	*	*	*	**
d. (S) $\phi$ (V) $\phi$ (O) $\phi$ (O) $\phi$	*	*		****
e. (SVOO) $\phi$	*	*	***	

## ii. Phonological phrasing in rapid speech

As it has been demonstrated earlier in this chapter, the phrasing (SVOO) $\phi$  emerges in rapid speech, suggesting the existence of another ranking of the assumed constraint system defined above. This new ranking emerges at rapid speech rates and evaluates p-phrases mainly on the basis of prosodic weight and to be more accurate in relation to the constraint *Binary Min (MaP)*.

**Tableau (14)**

<u>Imaan nawalat al-bint diftaar</u> S      V      IO      DO	<i>BinaryMin (MaP)</i>	$(SV C_1)\phi$	$(VC_1)\phi$	$(Complex)\phi$
a. (SVO) $\phi$ (O) $\phi$	*		*	**
b. (S) $\phi$ (VO) $\phi$ (O) $\phi$	**	*		*
c. (SV) $\phi$ (O) $\phi$ (O) $\phi$	**	*	*	*
d. (S) $\phi$ (V) $\phi$ (O) $\phi$ (O) $\phi$	****	*	*	
☞ e. (SVOO) $\phi$		*	*	***

However, the data from di-transitives, or to be more specific the phonological phrasing facts observed in di-transitives, prove to be beneficial in some other ways that are not intentionally intended.

- 1- They give us evidence for the relevance of the interface constraint ( $SVC_1$ ) in San'ani.

They indirectly support the assumption that the constraint  $(SVC_1)\phi$  is the dominant interface constraint in San'ani and the one responsible for the phrasing pattern  $(SVC_1)\phi$  in SVO sentences. As it is indicated above, if the phrasing that emerges at slow speech rate is  $(SVO)\phi$  ( $O\phi$ ) and if this phrasing pattern is supposed to result from the interface-defining (mapping) algorithm, then this means that phrasing of the subject, verb and its first complement together, not only in SVOO structure type, but even in SVO structure type, is one derived by the interface algorithm, more specifically by the  $(SVC_1)\phi$  constraint.

- ✓ *Indication 3: The  $(SVC_1)\phi$  interface constraint is undoubtedly in effect in San'ani*
  

  - 2- They give us evidence for the irrelevance of a constraint system consisting of the constraints  $*P\text{-Phrase}$ ,  $(Complex)\phi$ ,  $(VC_1)\phi$  and  $Binary\ Min\ (MaP)$ .

The observed phrasing patterns of the SVOO repetitions help us in one more way. Accordingly, the data on SVOO structure type helps us to get evidence for the irrelevance of a constraint system that consists of the constraints  $*P\text{-Phrase}$ ,  $(Complex)\phi$  and  $(VC_1)\phi$ . The argument goes as follows. If one assumes an end-based account for San'ani, then San'ani as right-branching, should have the constraint  $Align\text{-}XP, R$  in effect whose effect in SVO sentences can be captured within my new account by both  $(Complex)\phi$  and  $(V\ C_1)\phi^{220}$ . Moreover, the end-based makes use of one more general constraint  $*P\text{-Phrase}$  which can be ranked higher than  $Align\text{-}XP, R$  and thus help to suppress the effect of  $Align\text{-}XP, R$  favoring a phrasing with less (if not without any) boundaries. As it has been indicated earlier in this chapter (in footnotes 215 & 218 above), the phrasing

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<sup>220</sup> The effects attained by  $Align\text{-}XP, R$  in SVOO structures can be captured within the new OT account by both  $(Complex)\phi$  and  $(V\ C_1)\phi$  with  $(V\ C_1)\phi$  being ranked higher than  $(Complex)\phi$  to disallow the separate phrasing of the first complement.

pattern in SVO sentences can be accounted for in a way similar to the one employed by the end-based. Accordingly, *\*P-Phrase* can be ranked higher than both *(Complex)φ* and *(VC<sub>1</sub>)φ* and the observed phrasing (SVO)φ can then be accounted for.

However, and as the following two tableaus show, the phrasing facts in SVOO structures give us evidence for the irrelevance of a constraint system consisting of the constraints *(Complex)φ*, *(VC<sub>1</sub>)φ*, *\*P-Phrase* and *Binary Min (MaP)* in San'ani, as far as the available data is concerned. As it is shown by the two tableaus below, employing these constraints, the only phrasing pattern that can be predicted is the (SVOO)φ phrasing which emerges as optimal at both slow and rapid speech rates, contrary to the observed phrasing facts. As the second tableau below shows, the optimal phrasing pattern (SVOO)φ, emerging in rapid speech, can be accounted for by highly ranking the constraint *Binary Min (MaP)* over the other constraints. However, the optimal phrasing pattern (SVO)φ (O)φ, emerging in slow speech, cannot be accounted for by highly ranking the constraint *\*P-Phrase* over the other constraints and the first tableau below shows how the wrong phrasing pattern (SVOO)φ emerges as the optimal.

- In slow speech:

**Tableau (15)**

Imaan nawalat al-bint diftaar S      V      IO      DO	*P-Phrase	(VC <sub>1</sub> )φ	(Complex)φ	Binary Min (MaP)
a. (SVO)φ (O)φ	**	*	**	*
b. (S)φ (VO)φ (O)φ	***		*	**
c. (SV)φ (O)φ (O)φ	***	*	*	**
d. (S)φ (V)φ (O)φ (O)φ	****	*		****
e. (SVOO)φ	*	*	***	

- In rapid speech:

**Tableau (16)**

<u>Imaan nawalat al-bint diftaar</u> S V IO DO	<i>Binary Min (MaP)</i>	<i>*P-Phrase</i>	<i>(V C<sub>1</sub>) φ</i>	<i>(Complex) φ</i>
a. (SVO)φ (O)φ	*	**	*	**
b. (S)φ (VO)φ (O)φ	**	***		*
c. (SV)φ (O)φ (O)φ	**	***	*	*
d. (S)φ (V)φ (O)φ (O)φ	****	****	*	
e. (SVOO)φ		*	*	***

## 6.4 Summary

This chapter presents evidence for two types of cues to (major) phonological phrasing in San’ani: a phonological (segmental) cue and durational cues. The interesting thing is that both the durational and external sandhi phenomena signal the same prosodic structure pattern. These cues make it clear that the surface phonological phrasing in SVO sentences in San’ni is (SVO)φ. Evidence to support the fact that the level of phrasing being cued is the MaP level comes from extra recording of data on double object constructions where a boundary is observed to occur after the IO at slow speech rate (though not at rapid speech rate).

As it has been indicated, the emerging phrasing pattern for SVO sentences in San’ani is one where the subject, verb and object<sup>221</sup> are grouped together viz (SVO)φ. This pattern of phrasing, and as it has been demonstrated in this chapter, can find no account within the prevailing end-based theory. This is due to the fact that, based on the phrasing facts in di-transitive structures, a constraint system consisting of the constraints *\*P-Phrase*, *Binary Min(MaP)* and *Align-XP, R*, which the end-based theory may employ to account for these phrasing facts, proves to be irrelevant.

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<sup>221</sup> (i.e., the first complement of the verb.)

Worth mentioning here is that the end-based constraint *Binary Min (MaP)* has been shown, based on p-phrasing facts from di-transitives, to affect phrasing at rapid speech rates as a new pattern of phrasing of the SVOO sentence emerges in rapid speech, different from that observed in slow speech. However, the role of *Binary Min (MaP)* in SVO sentences is somewhat uneasy to detect since the phrasing pattern (SVO) $\phi$  emerges as optimal at both slow and rapid speech rates. This in itself is not a bad thing. It seems that the (SVO) $\phi$  phrasing type is one reinforced by both the interface algorithm ( $SVC_1\phi$ ) being the highest-ranking constraint in slow speech, and by the constraint *Binary Min (MaP)* being the highest-ranking one in rapid speech. Consequently, the phrasing (SVO) $\phi$  emerges as the optimal in SVO sentences at both slow and rapid rates of speech with no fail.

Thus, and as it has been demonstrated in this chapter, the phrasing facts observed in San'ani find (a) good story(ies) within the new spell-out-based account and its OT-counterpart. The two accounts reflect and validate each other in such a way that we are finally able to find a somewhat plausible account of the phonological phrasing facts in San'ani.

## CHAPTER - 7

### Conclusion

This dissertation discusses the syntax-phonology interface at the (major) phonological phrase level in some detail. It is a modest attempt to put (most of) the existing variability in the formation of MaPs within a more generalized spell-out-based design. Specifically, I argue that the variability in the formation of MaPs depends on what is spelled-out, itself a function of a phase head  $v^*$  and C.

The account developed in this dissertation basically builds on Chomsky's DbP though with five innovations/deviations:

- i. A phase head  $v^*$  (perhaps also C) belongs to its spell-out domain contra Chomsky's DbP and subsequent work.
- ii. Some kinds of phase heads can, in the case PIC2 is in effect, result in hindering, rather than initiating, spell-out on a previous phase.
- iii. Some forms of XP movement are not motivated by an EPP feature of a strong phase head mainly  $v^*$  but they are rather motivated by a last resort strategy to accomplish the spell-out instruction of this strong phase head.
- iv. Head movement occurs in syntax and can result in increasing the structure processed and spelled-out.
- v. Both PIC1 and PIC2 are optimal.

The assumption I pursue in this dissertation is that phase heads, mainly  $v^*$ , can regulate the spell-out process by deciding both the kind of spell-out applying and the timing of spell-out for a phase domain as follows:

- i. *Phase heads as the locus of parametric variations: The type of spell-out applying.*  
A phase head ( $v^*$  or C) can include genuine instructions regarding how the element/s in its domain will be spelled-out

*ii. Phase heads as spell-out triggers: The timing of spell-out relevant*

The choice between PIC1 and PIC2 is finally made by phase heads, that is, whether PIC1 or PIC2 will be in effect in a language (or in a context) is something decided by phase heads by taking into consideration the following two interacting factors:

- a. Phase heads as the *locus of parametric variations*.
- b. The fact that a (phase) head has reached *its landing site* (head movement).

In Chapter 5, a generalized constraint-based system is constructed in relation to the spell-out functions developed in Chapter 4. The new (spell-out-based) OT constraints are superior to the end-based ones, not only because they are developed within current syntactic assumptions as compared with the end-based constraints as X-bar-based ones, but also because they can cover a wider range of variability due to the introduction of two new interface constraints that have no equivalents within the end-based. In practice, these new OT constraints prove to be successful in accounting not only for languages handled by the end-based namely Chichewa, Kimatuumbi and Chi Mwi:ni, but even for languages as Xhosa, about which the end-based has no good story to tell.

Finally, Chapter 6 focuses on San'ani Yemeni. Employing both phonological and durational cues, the surface phonological phrasing for SVO sentences in San'ani is established as (SVO) $\phi$ . Two accounts has been developed to account for this observed phrasing : a spell-out-based account and a constraint-based one.

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